252.

SUPREME COURT OF THE UNITED STATES.

No. 216.

THOMAS OTIS LE ROY AND DAVID SMITH, PLAINTIFFS IN ERROR,

vs.

BENJAMIN TATHAM, JR., HENRY B. TATHAM, AND GEORGE N. TATHAM.

IN ERROR TO THE CIRCUIT COURT, U. S., FOR THE SOUTHERN DISTRICT OF NEW YORK.

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GIDEON, Printer.

UNITED STATES OF AMERICA, *ss.*

The President of the United States of America, to the judge of the circuit court of the United States for the southern district of New York, for the second circuit, greeting : [L. S.]

Because in the record and proceedings, as also in the rendition of the judgment of a plea which is in the said circuit court, before you, or some of you, between Benjamin Tatham, junior, George N. Tatham, and Henry B. Tatham, plaintiffs, against Thomas Otis Le Roy and David Smith, defendants, impleaded, &c., a manifest error hath happened, to the great damage of the said Thomas Otis Le Roy and David Smith, as is said, and as appears by the complaint : We, being willing that such error, if any hath been, should be duly corrected, and full and speedy justice done to the parties aforesaid in this behalf, do command you, if judgment be therein given, that then, under your seal, distinctly and openly, you send the record and proceedings aforesaid, with all things concerning the same, to the justices of the Supreme Court of the United States, at the Capitol, in the City of Washington, together with this writ, so that you have the same at the said place, before the justices aforesaid, on the first Monday of December next, that the record and proceedings aforesaid being inspected, the said justices of the Supreme Court may cause further to be done therein, to correct that error, what of right and according to the law and custom of the United States ought to be done.

Witness the honorable Roger B. Taney, chief justice of the Supreme Court of the United States, this second day of June, in the year of our Lord one thousand eight hundred and forty-nine, and of the independence of the United States the seventy-third. [L. S.]

ALEX'R GARDINER,
Clerk of the circuit court of the United States of America, for the southern district of New York, in the second circuit.

The answer of the judges of the circuit court of the United States, for the southern district of New York, in the second circuit, in the within writ mentioned :

The record and proceedings whereof mention is within made, with all things concerning the same, are hereby respectfully sent to the Supreme Court of the United States within mentioned, in a certain schedule to this writ annexed, as within it is commanded.

Witness the hon. Roger B. Taney, chief justice of the Supreme Court of the United States, this second day of December, in the year of our Lord one thousand eight hundred and fifty, and of the independence of the United States the seventy-fifth. [L. S.]

ALEX'R GARDINER,
Clerk.

Filed June 2nd, 1849.

By the honorable Samuel Nelson, one of the judges of the circuit court of the United States, for the southern district of New York, in the second circuit.

To Benjamin Tatham, jun., George N. Tatham, and Henry B. Tatham.

Whereas, Thomas Otis Le Roy and David Smith, lately issued out of the Supreme Court of the United States a writ of error, directed to the judge of the circuit court of the United States, for the southern district of New York, for the second circuit, stating, that in the record and proceedings, as also in the rendition of the judgment of a plea in the said court before the judge thereof, between Benjamin Tatham, junr., George N. Tatham, and Henry B. Tatham, plaintiffs, and Thomas Otis Le Roy and David Smith, impleaded defendants, a manifest error hath happened, to the great damage of the said Thomas Otis Le Roy and David Smith.

And whereas, for the correction of that error in due manner the said writ has been issued, returnable at the next stated term of the Supreme Court of the United States, to be held at the Capitol, at the city of Washington, on the first Monday of December next; you are, therefore, hereby cited to appear before the said Supreme Court, at the city of Washington, on the said first Monday of December next, to do and receive what may appertain to justice to be done in the premises.

Given under my hand at the city of New York, in the southern district of New York, in the second circuit, the second day of June, in the year of our Lord one thousand eight hundred and forty-nine, and of the independence of the United States the seventy-third.

S. NELSON.

I admit personal service of a copy of the within citation, 2d June, 1849.

GEO. C. GODDARD,
Att'y for Plaintiffs.

Pleas in the circuit court of the United States, for the southern district of New York, held at the City Hall, in the city of New York, on the fifteenth day of May, in the year one thousand eight hundred and forty-seven.

Witness the honorable Samuel Nelson and Samuel R. Betts, judges.

ALEXANDER GARDINER,
Clerk.

SOUTHERN DISTRICT OF NEW YORK, *ss.*

Be it remembered that heretofore, to wit, on the eighth day of May, in the year one thousand eight hundred and forty-seven, at the City Hall, in the city of New York, came Benjamin Tatham, junior, George N. Tatham, and Henry B. Tatham, by George C. Goddard, their attorney, and brought their bill before the judges of this court, against Robert W. Lowber, Thomas O. Le Roy, and David Smith, being in custody, &c., and thereby complained of the said defendants in a plea of trespass on the case, &c.; which said bill follows in these words, to wit:

SOUTHERN DISTRICT OF NEW YORK, *ss.*

Benjamin Tatham, junior, George N. Tatham, and Henry B. Tatham, by George C. Goddard, their attorney, complain of Robert W. Lowber, Thomas O. Le Roy, and David Smith, being in custody, &c., of a plea of trespass on the case, &c. ; for that whereas heretofore, to wit, on and before the thirty-first day of August, in the year 1837, John Hanson and Charles Hanson, of Huddersfield, in England, were the inventors of certain new and useful improvements in machinery or apparatus for making pipes and tubes from metallic substances; and afterwards, to wit, on the 10th day of January, in the year 1840, by an assignment in writing duly recorded in the Patent office, assigned to the said Benjamin Tatham, junior, and Henry B. Tatham, the full and exclusive right to the said improvements made by the said Charles Hanson and John Hanson, for which improvements letters patent of the United States afterwards, to wit, on the 29th day of March, 1841, were granted to the said Benjamin Tatham, junior, and Henry B. Tatham, as assignees of the said John Hanson and Charles Hanson.

And whereas, also, afterwards, to wit, on the 12th day of October, 1841, the said Benjamin Tatham, jr., and Henry B. Tatham, by an assignment in writing duly recorded, assigned unto the said George N. Tatham one undivided third part of the said letters patent, with all and singular the right and privileges appertaining thereto; and afterwards, to wit, on the 14th day of March, in the year 1846, the said letters patent last mentioned having been surrendered, pursuant to the act of Congress, on account of the defective specifications of the said improvements, new letters patent were issued therefor, on an amended specification, in due form of law, under the seal of the Patent office of the United States, signed by the Secretary of State, and countersigned by the Commissioner of Patents, bearing date the day and year last aforesaid, whereby there was granted to the said plaintiffs, their heirs, administrators, or assigns, for the term of fourteen years from the 31st day of August, 1837, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvements, a description whereof was annexed to, and made a part of, the said patent, as by the said letters patent and specification last mentioned, ready in court to be produced, will fully appear.

And the plaintiffs further say, that the said letters patent, and the exclusive right thereby granted, are of great value, to wit, of the value of fifty thousand dollars; yet the said defendants, well knowing the premises, and contriving to injure the plaintiffs, heretofore, to wit, on the first day of April, in the year 1846, and on divers days since, to the time of the commencement of this suit, in the district aforesaid, and in the city and county of New York, unlawfully and wrongfully, and without the consent or allowance, and against the will of the plaintiffs, did make, use, and vend to others to be used, the said improvements; and did put in operation and carry on the making of lead pipe by means

of the said improvements; and did make thereby a large quantity, to wit, two thousand tons of lead pipe, and sell the same, all in violation and infringement of the exclusive right so secured to the plaintiffs by the said letters patent, and contrary to the acts of Congress in such case provided; whereby the plaintiffs have been greatly injured and deprived of great profit and advantages which they might and otherwise would have derived from the said invention and letters patent, and have sustained actual damage to the amount of 20,000 dollars, and therefore they bring suit, &c.

And the said Thomas Otis Le Roy and David Smith, who are impleaded with the said Robert W. Lowber, defendant in this suit, by William Curtis Noyes, their attorney, come and defend the wrong and injury, when, &c., and say that they are not guilty of the said supposed grievances, above laid to their charge, in manner and form as the said plaintiffs have above thereof complained against them, &c. And of this the said defendants put themselves upon the country, and the said plaintiffs do the like, &c.

And the said Robert W. Lowber, in his proper person, comes and defends the wrong and injury, when, &c., and says nothing in bar or preclusion of the said action of the said plaintiffs; whereby the said plaintiffs remain therein undefended against the said Robert W. Lowber. Wherefore the said plaintiffs ought to recover against the said Robert W. Lowber their damages on occasion of the premises.

But because it is unknown to the court what damages the said plaintiffs have sustained on occasion thereof, and because it is convenient and necessary that there be but one taxation of the damages in this suit, therefore let the giving of judgment in this behalf, against the said Robert W. Lowber, be stayed until the trial of the said issue above joined between the said plaintiffs and the said Thomas Otis Le Roy and David Smith. And hereupon the process thereof is continued between the parties aforesaid, of the place aforesaid, in the same court, before the judges thereof, until the first Monday of April, in the year one thousand eight hundred and forty-nine, at the City Hall in the city of New York; the same day is given to the parties aforesaid, at the same place. And, as well to try the said issue as to inquire of and assess the damages which the said plaintiffs have sustained by reason of the premises against the said Robert W. Lowber, let a jury thereupon come before, &c., by whom, &c., and who neither, &c., to recognise, &c., because as well, &c.

At which time and place, before the judges aforesaid, come the parties aforesaid, by their attorneys aforesaid, and the jurors of the jury summoned to try the said issue also come; who, to speak the truth of the matters aforesaid, being chosen, tried, and sworn, say upon their oath that the said Thomas Otis Le Roy and David Smith are guilty of the premises above laid to their charge, in manner and form as the said plaintiffs have within complained against them. And they assess the damages of the said plaintiffs, by reason of the premises, as well against the Thomas Otis Le Roy and David Smith, as against the said Robert

W. Lowber, over and above their costs and charges by them about their suit in this behalf expended, to eleven thousand three hundred and ninety-four dollars, and for those costs and charges to six cents.

Therefore it is considered that the said plaintiffs do recover against the said defendants their said damages, costs, and charges, by the jurors aforesaid in form aforesaid assessed, and also three hundred fifty-four dollars fifty-four cents, by the court here adjudged of increase to the said plaintiffs, and with their assent; which said damages, costs, and charges, in the whole, amount to eleven thousand seven hundred forty-eight dollars sixty cents.

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Judgment signed June 2, 1849.

RICHARD E. STILWELL,
Deputy Clerk.

(*Endorsed.*)

Filed June 2, 1849.

U. S. circuit court, southern district of New York.

THOMAS OTIS LE ROY and David Smith, impleaded with Robert W. Lowber, ads.
BENJAMIN TATHAM, junior, and others.

The issues joined in this cause came on to be tried before the hon. Samuel Nelson, one of the associate justices of this court, at the city of New York, on the fourteenth day of May, 1849.

The plaintiffs' counsel then produced and read in evidence the patent and specification under which they claimed, in the following words:

Re-issue No. 82.

The United States of America, to all to whom these letters patent shall come.

Whereas, Benjamin Tatham, jr., and Henry B. Tatham, of Philadelphia, Penn., (assignees of John and Charles Hanson, of Huddersfield, England,) have alleged that the said John and Charles Hanson have invented new and useful improvements in the machine for making or manufacturing pipes and tubes from lead or other metallic substances, (the said Benjamin and Henry B. Tatham having assigned to George N. Tatham one-third of their right, title, and interest in said patent,) for which letters patent were granted to said John and Charles Hanson in England, dated August 31st, 1837, and to the said Benjamin and Henry B. Tatham, assignees as aforesaid of the said John and Charles Hanson, on the 29th day of March, 1841, in the United States, which letters patent are hereby cancelled on account of a defective specification; which they state has not been known or used before the said John and Charles Hanson's application; have made oath that they are by birth citizens of the United States; that they do

verily believe that the said John and Charles Hanson are the original and first inventors or discoverers of the said improvements, and that the same hath not, to the best of their knowledge and belief, been previously known or used; have paid into the treasury of the United States the sum of fifteen dollars, and presented a petition to the Commissioner of Patents signifying a desire of obtaining an exclusive property in the said improvements, and praying that a patent may be granted for that purpose.

These are, therefore, to grant according to law, to the said Benjamin, Henry B., and George N. Tatham, their heirs, administrators, or assigns, for the term of fourteen years from the thirty-first day of August, one thousand eight hundred and thirty-seven, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvements, a description whereof is given in the words of the said John and Charles Hanson in the schedule hereunto annexed, and is made part of these presents.

In testimony whereof I have caused these letters to be made patent, and the seal of the Patent office has been hereunto affixed.

Given under my hand at the city of Washington, this fourteenth day of March, in the year of our Lord one thousand eight [SEAL.] hundred and forty-six, and of the independence of the United States of America the seventieth.

JAMES BUCHANAN,
Secretary of State.

Countersigned and sealed with the seal of the Patent office.

EDMUND BURKE,
Commissioner of Patents.

The schedule referred to in these letters patent, and making part of the same.

To all whom it may concern.

Be it known, that we, John Hanson, of Huddersfield, in the county of York, in England, leaden pipe manufacturer, and Charles Hanson, of the same place, watchmaker, being respectively subjects of the Queen of Great Britain, have invented certain new and useful improvements in machinery or apparatus for manufacturing pipes and tubes from metallic substances; and we, the said John Hanson and Charles Hanson, do hereby declare, that the nature of our said invention, and the manner in which the same is to operate, are particularly described and ascertained in and by the following description thereof, reference being had to the drawings hereunto annexed, numbered respectively sheet 1 and sheet 2, and to the letters and figures marked thereon, that is to say:

Our said invention consists in certain improvements upon, and additions to, the machinery used for manufacturing pipes and tubes from lead or tin, or any alloy of soft metals capable of being forced by great

pressure from out of a receiver, through or between apertures, dies, and cores, when in a set or solid state, set forth in the specification of a patent granted to Thomas Burr, of Shrewsbury, in Shropshire, in England, dated the eleventh day of April, one thousand eight hundred and twenty, recited in the Repertory of Arts, &c., London, 2d series for 1822, vol. 41, page 267, &c., and described in the London Journal of Arts and Sciences, No. 6, for November, A. D. 1820, page 411, &c.

The apparatus described by Thomas Burr, consisted of a hollow vessel of iron, or other metal, made particularly strong, so as to be able to sustain extreme pressure, and bored sufficiently true for a piston to traverse easily within it. This vessel was closed at one end by the piston, and it was also closed at the other, excepting a small aperture in the centre, into which was fitted "a washer" or die of steel or other metal, intended to determine the external diameter of the pipe. The best form of this vessel is cylindrical, and it is termed "the cylinder," but it might be of various shapes. It was intended to contain the lead or other metal to form the pipes.

The piston that fitted this cylinder was of about equal length, and when driven home was intended to empty, or nearly to empty, the cylinder of its contents.

The core, or mandril, which determined the inner diameter of the pipe, was a long cylindrical rod, attached by one end to the centre of the face of the piston, and passing through the centre of the aperture or die, leaving a space between them for the formation of the pipe.

The pressure necessary to work the machine was obtained from any mechanism of sufficient force; but a very powerful hydraulic press was preferred, and the piston was driven home into the cylinder by the power of the ram of the hydraulic press; to the top of which press the cylinder was attached.

Heat was applied to the cylinder before and at the time of using, whereby the apparatus worked more easily, from causes which will hereafter sufficiently appear.

The metal to compose the intended pipe was admitted into the cylinder in a fluid state through the same aperture, by which the pipe afterwards issued. Upon the metal becoming set, or solid, the power of the press was exerted against the piston, whereby it would rise upwards, and drive out the metal through the washer or die, having the long core within it continually advancing with and before the piston, and thus forming the pipe.

The machinery and its operation will be better understood by reference to the patent and to the publications mentioned, which are well known among mechanics and scientific men.

But the defects of T. Burr's plan, when reduced to practice, (especially in the manufacture of pipes of less than one and an half inch in bore,) were found to be so great as to prevent that plan from being brought into common use. The long core, in his machinery, being attached to the piston, is liable, in advancing with it, to warp and twist out of the

straight line, and out of centre with the die, from the difference of expansion and contraction of the metal under different degrees of temperature, and from the extreme pressure required, and from other causes, which prevent or destroy the uniformity of the thickness, and the centrality of the bore of the pipes or tubes.

We have found, from experience, that lead, and some of its alloys, when recently become set, (or in a condition just short of fluidity,) being still under heat and extreme pressure, in a close vessel, will reunite perfectly after a separation of its parts, and "heal (as it were) by the first intention," as completely as though it had never been divided."

We therefore construct our machinery as follows, to wit:

Firstly. We employ a contrivance, which may be called a bridge, a cross bar, a holder, or a guide piece, which is placed near to the die or aperture at the end of the cylinder, for the purpose of receiving and holding a short fixed core, or of guiding the moveable long core, as hereafter described.

This bridge is fixed within, and at the end of the cylinder, and at a short distance from the die through which the pipe issues. It is so formed and arranged as to allow the metal to pass through it, and to form around the core.

Secondly. We in general use a short fixed or stationary core for determining the inner diameter of the pipes or tubes, or the bore thereof, in contradistinction to the long moveable core, as described in the specification of Thomas Burr.

This short core is attached to the bridge in any secure manner, or the bridge and the core might be constructed in one piece, and formed in various ways, as convenience might suggest.

Instead of this short core, however, we sometimes use the long moveable core attached to the piston, resembling that of Thomas Burr; and in this case we employ the bridge for the purpose of guiding the long core, and keeping it central with the die; the said moveable core traversing freely through an aperture in the centre of the bridge, which, in this case, operates as a guide piece.

Thirdly. We form a chamber between the bridge and the die, wherein the metal, after passing the bridge, may reunite into one mass, having the core in its centre. It is the space before the die.

The chamber may be made of any convenient form or size. In the accompanying drawings it is exhibited sometimes cylindrical, as at KK, fig. 19, sheet 1; sometimes nearly square, as at KK, figures 7, 9, 10, and 11, sheet 2; and sometimes conical, as at X, figures 1, 20, and 21, sheet 1, and at figure 22, sheet 2.

This chamber may be a part of the cylinder itself, or of the die, or even of the bridge, or it may be formed by a separate piece or pieces, securely fastened to the end of the cylinder, or otherwise. We prefer the latter plan, from the facility it gives of removing and changing the cores and dies when required to make pipes of different sizes; and the conical form may be preferable, as it may diminish the friction, and require less pressure

The chamber should be larger in area, or in diameter, than the aperture between the die and the core, to facilitate the passage of the metal, and to admit of constriction at the die by which the metal is brought into its proper form of pipe, it being the narrowest aperture.

The die we use is substantially the same as that described by Thomas Burr, under the appellation of "a washer." It should be of steel or other metal, with a suitable aperture through it to form the exterior of the pipe. The particular form of the die is not material, but it is essentially different both in shape and object from a mould. It is usually constructed of a separate piece, but it might be formed of several pieces, or be made a part of others, or an aperture in the end of the cylinder itself might be used as a die. Various forms might be suggested. It is best though not essential that the surface inside, which forms the exterior of the pipe, should be as short as possible, consistently with the strength required to sustain the great pressure and constriction at this narrow passage.

We use substantially the same cylinder and piston as described by Thomas Burr. We use much the same heat and the same pressure. We use the bridge either as a guide-piece for his long core, or in preference we employ the bridge as a holder for our short core.

The following four enumerated particulars are matters of convenience, but are by no means essential to our apparatus:

Firstly. We use an improved mode of adjusting the die, by which we are enabled easily and readily to bring the same central with the core, at any time, in case it should be forced out of its relative true position.

Secondly. With a view to prevent the escape of the lead between the piston and the cylinder, we sometimes use an improved construction of the piston, by which its packing is forced outwards against the inside of the cylinder, by the pressure of the face or end of the piston against said packing. It will be better understood by referring to the drawings. There are, also, other methods by which the same object can be effected.

Thirdly. We reverse the arrangement of the cylinder and piston, by placing the piston above and the cylinder below, instead of securing the cylinder to the top of the hydraulic press as in Thomas Burr's plan.

In our method, when an hydraulic press of that kind is used, in which the power of the ram is exerted from above, we should attach the piston to the ram, and cause it to be driven downwards into the cylinder fixed stationarily to receive it. Very great force, however, being required, we prefer an hydraulic press of the opposite construction, in which the ram is made to rise perpendicularly upwards; and in this case we secure the piston to the top of the press, and place the cylinder beneath upon the table or platform, supported by a hollow pillar, with an aperture for the passage of the pipe, all resting upon the usual ram of the hydraulic press. Thus when the ram ascends, the cylinder is

made to rise and advance upon the stationary piston. (See Fig. 22, sheet 2.)

In connexion with this reversed arrangement, we feed the cylinder through an aperture in the upper end, or side opposite to the dies, and directly under the piston, when the die and piston are at the greatest distance apart, (as shown at K, fig. 19, sheet 1, annexed.) This aperture is immediately closed as it passes the lower end of the piston. By this means, the necessity of melting out the lead, which clogs the dies after each operation, and of filling the cylinder through the dies themselves, or through apertures made for this purpose in the solid end of the cylinder, is obviated; such apertures being injurious to the strength in a part where strength is particularly wanted, and said openings requiring, when so used, to be stopped by means of plugs or screws.

By this reversed arrangement, also, great facility in working the machinery is obtained. Oil or other lubricating materials may be easily applied to the dies and cores, or other parts situated at the bottom of the cylinder, previous to pouring in a fresh charge of metal; and, further, the pipes (instead of being forced upwards, and being received above the top of the hydraulic press, as in Thomas Burr's plan) are caused to issue downwards, and may be immediately wound upon reels, or may be received in a long descending cooling trough, without requiring to be handled whilst warm, and liable to injury.

Fourthly and lastly. We arrange, combine, and adapt our mechanism, so as to make two or more lengths of pipes at one and the same time and operation, and for this purpose we provide two or more apertures, furnished with the requisite apparatus for the formation of the pipes.

All these improvements will be better understood by referring to the accompanying drawings, which are sectional and detached views of the cylinder and various parts, to which we shall now refer.

Fig. 1, on sheet 1, is a vertical section of the lower portion of a cylinder, with the piston shown therein, and also our improved construction and adaptation of a short core, with the die applied thereto.

Fig. 2 is a horizontal section of the cylinder, taken in the line a, b, in fig. 1, or just above the bridge, core, and die.

Fig. 3 is another similar partial section of the same, taken in the line c, d, in fig. 1, or just below the bridge, for the purpose of showing the die more clearly.

Fig. 4 is a plan view of the die detached, showing the situation of the core within the aperture.

Fig. 5 is a detached side view of the short fixed core, and its crossbar or bridge; and fig. 6 is a plan view of the same.

A, A, fig. 1, is a portion of the cylinder B, the piston which is fixed or stationary in the strong top framework of the hydraulic press. C is the piston face or end, (attached to the body of the piston,) the various parts of which are shown separate at figures 13 to 18, inclusive, and will be described hereafter. D is the lower end or bottom of the cylinder, firmly attached thereto by bolts, and also to a strong table or

platform placed upon a hollow pillar, which stands upon the top of the usual ram of the hydraulic press. (The table and parts below are shown at fig. 22, sheet 2.) E is the die, which is fitted into the bottom of the cylinder in a recess or cup, as shown in the drawings. F, F, are adjusting screws for setting or regulating the situation of the die as regards the core. G, fig. 19, and figures 2 and 3, is a thin steel plate fitted into the recess in the bottom of the cylinder, merely for the purpose of preventing the metal from being driven between the edges of the die and the recess, or to the adjusting screws, the threads of which might otherwise become clogged. It is exhibited in several of the drawings, thus leaving the chamber between the bridge and the die, of a cylindrical form. It is, however, not essential, since the chamber may be of any convenient form, and in fact the plate G, and the ring Z, (hereafter described,) may both be dispensed with altogether. But as a substitute for the plate G, we prefer the steel ring Z, which makes the chamber conical, and is employed and exhibited in figures 1 and 20, sheet 1. The diameter of the aperture through the steel ring Z, is greatest at the edge or side next to the bridge, and diminishing downwards, it is smallest at the end next to the die; the aperture being thus of the form of an inverted cone. But we have sometimes made it cylindrical.

Fig. 20 is a view of a section of the ring Z.

Fig. 21 is a sectional representation (on another scale) of the chamber X, as formed by the ring Z, with the die E below, and the bridge I above it. When fitted in their places in the bottom of the cylinder, as exhibited in figures 1 and 21, the steel ring rests upon the die E, protects the adjusting screws F, F, by interposition, and forms a support for the bridge I. In figures 1, 2, 5, 6, 19, and 21, the bridge is shown by the letter I, and the short fixed core by the letter H when used.

K, fig. 1 and fig. 19, shows the situation of the aperture in the upper part of the cylinder, or side, or end opposite to the dies, through which the cylinder is filled with melted metal, and which is immediately closed by the passage of the piston end. This is more convenient than to withdraw the piston.

Fig. 7, sheet 2, is another vertical section of the lower part of a cylinder, showing a novel adaptation of our mechanism for making four different lengths of pipes at one and the same time.

Fig. 8 is a partial sectional plan view of the same, taken in the line g, h, in fig. 7.

Fig. 9 is a horizontal section or plan view, taken at the line e, f, the plate H being removed.

Fig. 10 is another horizontal section taken through the dies and cores in the line a, b, in fig. 7.

Figure 11 is a plan view of the bottom of the cylinder, the dies and cores being removed to show its construction.

Fig. 12 is a side view of one of the cores detached.

In figures 7, 9, 10, and 11, sheet 2, A, A, is the cylinder; B, B, the

bottom of the same; C, C, are the dies, the cores and apertures of which are, in these instances, placed in a horizontal position; D, D, are the screws for properly adjusting the horizontal situation of the dies as regards the cores; and E, E, are wedges for adjusting the vertical position of the dies to the cores. F, F, are the cores or mandrils fixed into a forming part of stocks or pieces of metal, G, G, which are mortised into one another, and also into the bottom of the cylinder, as shown in the drawings.

The arrows indicate the course of the metal as it passes out of the cylinder in the form of pipes, which is shown by a red tint, as in the other figures. H is the thin steel plate (here used instead of the steel ring) having four apertures formed into it, corresponding with the wells or recesses formed in the bottom of the cylinder, which steel plate is placed on the top of the dies to prevent the access of metal to the adjusting screws; and I, I, are other plates placed in front of the dies for the same purpose, and to prevent its access to the wedges. The bottom of the cylinder has four wells or chambers, K, K, formed in it, as shown more particularly in figure 11, to allow of the passage of the pipe metal to the different dies and cores.

Figure 13, sheet 1, is a representation of the end of the piston upon our improved construction.

Figure 14 is a similar representation, with the parts detached, shown separate at figures 15, 16, 17 and 18; a is the body of the piston; b is the lower end or face of the piston, attached to the body by the pin c; d is the upper part of the piston. Between the inclined or conical-shaped sides of the parts d and b, is placed the ring e, shown, detached, in plan in figure 17, and in section at figure 18; and being cut, consequently it will be obliged to expand, and keep the piston tightly packed, with the cylinder under great pressure, and thereby prevent the escape of the metal. The piston face is attached to the body a, by means of a pin h, passed through it, or in any other convenient manner.

Figure 19 is a vertical section of a cylinder and piston, showing the adaptation of the guide-piece or bridge, through which the long core attached to the piston passes, for the purpose of keeping it central with the die. A, A, is the cylinder. B is the piston body. C, the face or end of the piston. D the bottom of the cylinder. E the die. G is the thin steel plate (here exhibited instead of the steel ring that in figures 1 and 21 makes the chamber conical in form.) F, the adjusting screws. H is the long core attached to the piston C, and travelling with it, passing freely through the guide-piece or bridge I, I, which has a hole properly bored through it for this purpose, consequently keeping the core at all times steady and central with the die. K is the aperture for supplying the cylinder with melted metal. Figure 22, sheet 2, exhibits the reversed arrangement of the cylinder A, and the piston B; L L is the table; M the top of the hydraulic press; N is the hollow pillar standing upon the ram.

The operation of making pipes or tubes is as follows: The cylinder should be warmed, as mentioned by Thomas Burr, by any convenient

means, as well for the purpose of making the apparatus work more easily, as to preserve the pipe metal within at an uniform temperature throughout its mass, and thus to permit it to set equably.

When a die, bridge, and core, of the required diameter, have been applied to the cylinder, and properly adjusted, the cylinder and other parts being lowered, a charge of lead or other metal, in a fluid state, is admitted through the aperture (K, fig. 19 and fig. 1,) at the side, or at the end of the cylinder opposite to the die, and immediately under the piston. And as soon as this metal is "set," the hydraulic press is put in action, and as the ram, hollow pillar, table, cylinder, with its appurtenances, rise upwards; the feeding aperture is first closed by the stationary piston, and when this is effected, the metal is forced in the direction of the arrows in figure 1, between the arms or apertures of the bridge I, through the chamber and through the space between the die and the core below it, being caused, by the extreme pressure and constriction, to re-unite perfectly around the core in its passage, and leaving the machinery in the form of pipes or tubes. The pipe may be received in a long descending cooling trough, or may be immediately wound upon reels as fast as it is discharged from the machinery.

The pipe metal is represented in the drawings by a tint of red color.

We wish it to be understood that we do not confine ourselves to the mode of operation herein described, by making the cylinder rise with the hydraulic ram and other parts, and keeping the piston stationary, as the same effects will take place when the cylinder is stationary, and the power of the ram is applied to the top of the piston to cause it to descend into the cylinder; and our improvements might also be applied to a cylinder and press fitted up in other respects upon Thomas Burr's plan, whereby the pipe is received over the top of the machinery, although at some disadvantage; or the press might be laid horizontally or otherwise. Neither do we confine ourselves to making the bridge, which holds or guides either the short or the long cores, with four arms only, since it might be made of various constructions, with one, two, three, or more arms or apertures; or it might be a circular plate with holes through it; or it might be constructed as a projection at or near the bottom of the cylinder, with one large aperture nearly surrounding it, and thus hold the core in a horizontal direction, if desired, so as to discharge the pipes laterally or otherwise; all which, and other variations, will readily suggest themselves to any practical engineer without departing from the substantial originality of our invention, the remarkable feature of which is, that soft metals when in a set state, being yet under heat, can be made by extreme pressure to re-unite perfectly around a core after a separation, and thus be formed into strong pipes or tubes.

Pipes thus made are found to possess great solidity and unusual strength, and a fine uniformity of thickness and accuracy of bore is arrived at, such as (it is believed) has never before been attained by any other machinery.

The essential difference in the character of this pipe which dis-

tinguishes it (as well as that contemplated by Thomas Burr,) from all other heretofore known or attempted, is, that it is wrought under heat, by pressure and constriction, from set metal; and that it is not a casting formed in a mould.

We do not claim as our invention and improvement any of the parts of the above described machinery, independently of their arrangement and combination above set forth.

What we claim as our invention, and desire to secure by letters patent, is—

The combination of the following parts above described, to wit, the core and bridge of guide piece, with the cylinder, the piston, the chamber, and the die, when used to form pipes of metal, under heat and pressure, in the manner set forth, or in any other manner substantially the same.

JOHN HANSON,
CHARLES HANSON.

Witnesses to the signing by the said John and Charles Hanson—
ALBERT DAVY, *Consul, U. S. A.*
WILLIAM NORTH,
Clerk to Payne, Eddison, and Ford,
Solicitors, Leeds.

And hereupon the plaintiffs' counsel read in evidence certain agreements between the defendants, dated April 13th and May 13th, 1846, relative to the manufacture of lead pipe by the defendant Lowber for the defendants Le Roy and Smith.

And the plaintiffs' counsel then and there gave evidence tending to prove that the said John Hanson and Charles Hanson were the original and first inventors of the improvement described in the said letters patent; that the invention and discovery therein described was new and useful; that the lead pipe manufactured thereby was superior in quality and strength, capable of resisting much greater pressure and more free from defects than any pipe before made; that in all the modes of making lead pipe previously known and in use, it could be made only in short pieces, but that by this improved mode it could be made of any required length, and also of any required size; and that the introduction of lead pipe made in the mode described, had superseded the use of that mode by any of the modes before in use, and that it was also furnished at a less price.

And the plaintiffs also then and there gave evidence tending to prove that lead, when recently become set, and while under heat and extreme pressure in a close vessel, would re-unite perfectly, after a separation of its parts; and that in the process described in the said patent lead pipe was manufactured by being thus separated and re-united, and that the said John and Charles Hanson were the first and original discoverers thereof; and that such discovery, and its reduction to a practical result in the mode described in said letters patent, was highly useful and important.

And the plaintiffs did then and there give evidence tending to prove that the defendants had been jointly concerned and engaged in manufacturing lead pipe upon the plan described in the said letters patent, and in aiding and assisting the said Lowber therein, and selling the same, and in the making and use of machinery upon the said plan, and had thus made and sold large quantities of pipe; and that the agreement aforesaid between the said defendants, relative to the manufacture of pipe, was not real and bona fide, but was colorable only, and made as a cover to protect the defendants, Le Roy and Smith, from responsibility for the use of the patent, while they received the profits thereof, and to throw the responsibility on the defendant, Lowber, who was insolvent.

And the plaintiffs did then and there give evidence tending to prove that the said improvement described in the said letters patent was the same invention and discovery which had been made by the said John Hanson and Charles Hanson, and for which letters patent had been granted to them in England, and subsequently to the said Benjamin Tatham and Henry B. Tatham, as recited in the said letters patent, dated the 14th day of March, 1846.

And the plaintiffs did also then and there give in evidence tending to prove that they had been ready and willing, and had offered to sell the said invention within eighteen months succeeding the issuing of the said letters patent to them, dated March 29th, 1841, and also since; and had, within the said eighteen months, sold the same for a large portion of the United States.

The plaintiffs' counsel then rested their case, and the defendants' counsel then opened the defence.

The defendants' counsel then read in evidence from the Repertory of Arts, volume 16, page 344, the description of the patent to John and Charles Hanson, dated 31st August, 1837.

Patent to John and Charles Hanson, sealed August 31st, 1837.

To John Hanson, of Hudderfield, in the county of York, leaden pipe manufacturer, and Charles Hanson, of the same place, watchmaker, for their invention of certain improvements in machinery and apparatus for making or manufacturing pipes, tubes, and various other articles, from metallic and other substances. (Sealed, August 31st, 1837.)

(The Patentees have entered a disclaimer to part of the title, which being altered, now reads as follows—"certain improvements in machinery or apparatus for making or manufacturing pipes and tubes from metallic substances.)

This invention, of certain improvements in machinery or apparatus for making or manufacturing pipes and tubes from metallic substances, applies to the machinery or apparatus for making or manufacturing pipes and tubes from lead or tin, or a mixture or compound of lead with other metals, as tin or zinc, or any other compound or alloy of soft metals, capable of being squeezed or forced by means of great pres-

sure from out of a cylinder or receiver, through or between apertures, dies and cores, when in a solid state, described and set forth in the specifications of a patent granted to Thomas Burr, of Shrewsbury, dated the eleventh day of April, one thousand eight hundred and twenty.

And the said improvements consist, firstly, in the arrangement, construction, and application of a short fixed or stationary core for determining the inner diameter or bore of the said pipes or tubes, in contradistinction to the long moveable core, as described in the specifications of the said Thomas Burr, which long core in his machinery or apparatus is attached to the piston of the cylinder, and is liable to warp and twist out of the straight line, and out of centre with the dies, from the difference of expansion and contraction of the metal under different degrees of temperature, pressure, and other causes.

Secondly, in an improved mode or method of arranging, constructing, adapting, and adjusting the dies or apertures, which determine the outer diameter of the said pipes and tubes, for the purpose of enabling the workmen easily and readily to bring the same central with the core, when applying a fresh set of dies and cores to the cylinders, in order to make pipes of different sizes, or in case the same should get out of their relative true positions from any other cause.

Thirdly, in the arrangement, construction, and adaptation of the said improved parts, or mechanism, by which we are enabled to make two, three, or more lengths of pipes or tubes at one and the same time and operation.

Fourthly, in the application of a fixed guide-piece, cross-bar, or bridge placed near to the dies or apertures, at the end of the cylinder, for the purpose of guiding or conducting a long moveable core attached to the piston, and keeping it central with the dies, when such kind or construction of core and machinery is used for making pipes and tubes, such moveable core or rod passing through the said guide-piece, cross-bar, or bridge. By means of which several improvements, we are enabled to work the said machinery or apparatus in different position to Thomas Burr's machinery, and obtain great facility in such manufacture. Our improved machinery or apparatus being placed so as to discharge its pipes or tubes downwards, instead of upwards, whereby the necessity of filling the cylinder with melted metal through the dies themselves, or through apertures made for this purpose, in the solid end of the cylinder, is obviated; such apertures, when so used, requiring to be afterwards stopped with plugs or screws.

The cylinder or receiver of our improved machinery being filled at the opposite end to that in which the die and core are placed, by pouring melted lead or soft metal therein through an aperture, made in the side of a cylinder, directly under the piston, when the die and the piston are at the greatest distance apart, (as shown in fig. 17,) the said aperture being closed as it passes the piston; and further, we are enabled easily to apply oil or other lubricating materials to the dies and cores, or other parts, situated at the bottom of the cylinder, previous to

pouring in a fresh charge of material; and, lastly, in an improved arrangement and construction of piston, adapted to the cylinder used in the said process or manufacture of pipes or tubes; all of which improvements will be better understood by referring to the accompanying drawings, which are several sectional and detached views of the cylinder, and various parts, drawn on a large scale, and to which I shall now refer.

Plate XV, fig. 1, is a vertical portion of the lower portion of cylinder, with the piston shown therein, and also our improved construction and adaptation of a short core, with the dies applied thereto; fig. 2 is a horizontal section of the cylinder, taken in the line a b, in fig. 1, or just above the cross-piece or bridge-piece, core and die; fig. 3 is another similar partial section of the same taken in the line c d, in fig. 1, or just below the cross-piece, for the purpose of showing the die more clearly; fig. 4, is a plan view of the die detached, showing the situation of the core within the aperture; fig. 5 is a detached side view of the short fixed core, and its cross piece or bridge; and fig. 6 is a plan view of the same. A, A, is a portion of the cylinder; B, the friction rod, which is fixed or stationary in the head of the strong frame work of the apparatus; C, is the piston attached to the rod, the various parts or details of which are shown separate at figs. 13 to 18, inclusive, and will be described hereafter; D, is the end or bottom of the cylinder, to which it is firmly attached, and also to a strong hollow pillar, table, or platform, placed on the top of the usual hydraulic ram; E, is the die which is fitted into the bottom of the cylinder, in a recess or cup, as shown in the drawings; F, F, are adjusting screws, for setting or regulating the situation of the die as regards the core; G, is a thin steel plate, fitted very accurately into a cup or recess in the bottom of the cylinder, for the purpose of preventing the lead, or other set metal, getting between the edges of the die and the inner diameter of the recess or cup, and also to the adjusting screws, the threads or worms of which would otherwise become clogged; H, is the short fixed core or mandril, which is properly fitted into the cross-piece, bridge or holder, I, I, which is also accurately fitted in another or larger recess in the bottom of the cylinder, such recess being formed above the one in which the die is placed.

The operation of making or manufacturing pipes or tubes is as follows: After a die and core of the required diameter have been applied to the bottom of the cylinder and properly adjusted, the cylinder and other parts being lowered, a charge of lead, or other soft metal, is admitted through the aperture, at the side of the cylinder immediately under the piston, from a pot or reservoir containing melted metal, and as soon as this metal is set, or become hard or solid, and before it becomes cold, the power of the hydraulic press is set in action, and as the hydraulic ram, hollow pillar, table, cylinder, or lead holder, with its bottom fitted with its core and die, rises upward, the feeding operation is first closed by the stationary piston, and when this is effected, the metal is forced in the direction of the arrows, in fig. 1, between the arms of the cross-

piece, bridge, or holder I, into the cup or recess in the bottom D, and thence through the space between the internal diameter of the bore of the die E, and the outer diameter of the core H, leaving the cylinder in the form of pipes or tubes, the size of which is determined by the diameter of the die or core. The tube or pipe is wound upon drums or reels as fast as it is discharged from the machinery.

The set metal is represented in the drawings by a tint of red color.

I may here remark, that it might be supposed that the metal, being divided in its descent by the four arms of the cross-piece I, in four parts, would not unite together again at the point of entering the space between the die and the core; but practice proves the contrary, as the metal leaves our improved apparatus as perfect, solid, and compact pipes or tubes.

Fig. 7 is another vertical section of the lower part of a cylinder, showing the novel arrangement, construction, and adaptation of our improved mechanism, as adapted and arranged to make four different lengths of pipes or tubes from one cylinder at the same time. Fig. 8 is a partial sectional plan view of the same, taken in the line g, h; in fig. 7, fig. 9 is a horizontal section or plan view, taken at the line e, f, the plate H being removed.

Fig. 10 is another horizontal section, taken through the dies and cores in the line a, b, in fig. 7. Fig. 11 is a plan view of the bottom of the cylinder, the dies and cores being removed to shew its construction. Fig. 12 is a side view of one of the cores detached; A, A, is the cylinder; B, B, the bottom of the same; C, C, are the dies, the bores or apertures of which are, in this instance, placed in a horizontal position; D, D, are the screws for properly adjusting the horizontal situation of the dies as regards the cores or mandrils; and E, E, are the wedges for adjusting the vertical position of the dies to cores; F, F, are the cores or mandrils fixed into, or forming part of, stocks or pieces of metal, G, G, which are mortised into one another, and also into the bottom of the cylinder, as shown in the drawings, and thereby securely retained in their proper situation. The arrows indicate the course of the metal as it passes out of the cylinder in the form of tubes or pipes, which is also shown in the other figures; H, is the thin steel plate having four apertures formed in it, corresponding with the wells and recesses formed in the bottom of the cylinder; which steel plate is placed on the top of the dies to prevent the access of set metal to the adjusting screws; and I, I, are other plates, placed in front of the dies, for the same purpose, and to prevent its access to the wedges. The bottom of the cylinder has four wells or recesses, K, K, formed on it, as shown more particularly in fig. 11, to allow of the passage of the set metal to the different dies and cores.

Fig. 13 is a representation of the end of the piston rod, shown detached from the cylinder, with our improved construction of piston attached thereto. Fig. 14 is a similar representation, with the parts of the piston detached, which are shown separate at figs. 15, 16, 17, and 18; a, is the piston rod; b, the lower end or butt of the piston attached

to the rod by the pin c; d, is the upper part of the piston; between the inclined or conical shaped sides of the parts d and b, is placed the ring e, shown detached in plan, at fig. 17, and in section, at fig. 18; the sides of this ring are also inclined or conical, and it is cut or severed by means of a saw in the direction shown by the line f, g, in fig. 18; and consequently it will be obliged to expand, and keep the piston tightly packed with the cylinder, under great pressure, and thereby prevent the escape of metal past the piston. The piston is attached to its rod u, by means of a pin, h, passed through it and the pin c, or in any other convenient manner.

Fig. 19 is a vertical section of a cylinder and piston, showing our last improvement applied thereto, (videlicet) the application and adaptation of the guide-piece, or cross-piece, or bridge, through which the long core or rod attached to the piston passes for the purpose of keeping it central with the dies; AA is the cylinder, B the piston rod, C the piston, D the bottom of the cylinder, E the die, G the thin steel plate, F the adjusting screws, H the long core or rod attached to the piston C, and travelling with it, passing freely through the guide-piece, cross-piece, or bridge I, I, which has a proper shaped hole bored through it for this purpose, consequently keeping the core at all times steady and central with the die; K is the aperture for supplying the cylinder with melted metal.

And we would here remark, that we wish it to be distinctly understood that we do not mean or intend to confine ourselves to the mode of operation herein above described, by making the cylinder rise with the hydraulic ram and other parts, and keeping the piston stationary, as the same operations and effects will take place when the cylinder is fixed or stationary, and the power of the hydraulic ram applied to the top of the piston rod to cause it to descend into the cylinder; nor do we confine ourselves to the making or forming the cross-piece or bridge, which holds or guides either the short or long cores with four arms, as it may be made with one, two, or three arms; all of which variations will readily suggest themselves to any practical engineer, without departing from our invention.

Having now particularly described and ascertained the nature of our improvements, and the manner of carrying the same into effect, we would remark, that we do not mean or intend to claim any of the parts of the cylinder or piston rod, or the manner of fitting them up in the frame work of the press or machinery, nor the mode or method of connecting them to one another, as none of them are new, and they may be varied and fitted up in different ways to suit different arrangements of machinery.

Our invention or improvement, as above stated and set forth in the commencement of this specification, being firstly in the arrangement, construction, and application of the short fixed core H, for determining the inner diameter of the pipes or tubes; secondly, in the improved mode of constructing, adapting, and adjusting the dies or apertures which determine the outer diameter of the pipes or tubes; thirdly, in

the adaptation of the said improved parts, by which two, three, or more lengths of pipes or tubes can be made at one and the same time and operation; fourthly, in the application of the fixed guide-piece I, for the purpose of guiding a long moveable core or rod when attached to the piston, and keeping it central with the dies; and, lastly, in the improved piston C of the cylinder, for making such pipes and tubes.

(Enrolled in the Rolls Chappel office, 28th February, 1838.)

Specifications drawn by Messrs. Newton & Berry.

They also read in evidence the patent issued upon the application of plaintiffs to the Patent office, another specification, as follows:

No. 2021.

The United States of America, to all to whom these letters patent shall come:

Whereas, John and Charles Hanson, of Huddersfield, England, have alleged that they have invented new and useful improvements in the machine for making or manufacturing pipes and tubes from lead or other metallic substances, having assigned their right, title, and interest in said improvements to Benjamin Tatham, the younger, of Hitchen, England, and Henry B. Tatham, of Philadelphia, Pennsylvania, which they state has not been known or used before their application; have made oath that they are subjects of the Queen of Great Britain; that they do verily believe that they are the original and first inventors or discoverers of the said improvements, and that the same hath not, to the best of their knowledge and belief, been previously known or used; have paid into the treasury of the United States the sum of five hundred dollars, and presented a petition to the Commissioner of Patents, signifying a desire of obtaining an exclusive property in the said improvements, and praying that a patent may be granted for that purpose:

These are, therefore, to grant according to law, to the said Benjamin Tatham and Henry B. Tatham, their heirs, administrators, or assigns, for the term of fourteen years from the thirty-first day of August, one thousand eight hundred and thirty-seven, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used, the said improvements, a description whereof is given in the words of the said John and Charles Hanson in the schedule hereunto annexed, and is made a part of these presents.

In testimony whereof I have caused these letters to be made patent, and the seal of the Patent office has been hereunto affixed.

Given under my hand at the city of Washington, this ninth day [SEAL.] of March, in the year of our Lord one thousand eight hundred and forty-one, and of the independence of the United States of America the sixty-fifth.

FLETCHER WEBSTER,
Secretary of State, acting.
H. L. ELLSWORTH,
Commissioner of Patents.

The schedule referred to in the annexed letters patent, and making part of the same.

To all to whom it may concern: Be it known that we, John Hanson, of Huddersfield, in the county of York, in England, leaden pipe manufacturer, and Charles Hanson, of the same place, watchmaker, being respectively subjects of Great Britain, have invented "certain new and useful improvements in machinery or apparatus for making or manufacturing pipes or tubes from metallic substances; and we, the said John Hanson and Charles Hanson, do hereby declare, that the nature of our said invention, and the manner in which the same is to be performed, are particularly described and ascertained in and by the following description thereof, reference being had to the drawings hereunto annexed, numbered respectively sheet 1 and sheet 2, and to the letters and figures marked thereon, that is to say:

Our invention of "certain new and useful improvements in machinery or apparatus for making or manufacturing pipes and tubes from metallic substances," applies to the machinery or apparatus for making or manufacturing pipes and tubes from lead or tin, or a mixture or compound of lead with other metals, as tin or zinc, or any other compound or alloy of soft metals, capable of being squeezed or forced by means of great pressure from out of a cylinder or receiver, through or between apertures, dies, and cores, when in a solid state, described and set forth in the specification of a patent granted to Thos. Burr, of Shrewsbury, in Shropshire, in England aforesaid, dated the eleventh day of April, one thousand eight hundred and twenty. (In London Journal of Arts and Sciences, No. VI, for November, A. D. 1820, page 411, &c.]

We construct our machinery as follows, to wit:

1st. We in general used a short fixed or stationary core, for determining the inner diameter of the pipes or tubes or the bore thereof, in contradistinction to the long moveable core as described in the specification of the said Thomas Burr; which long core in his machinery or apparatus is attached to the piston of the cylinder as arranged by him, and is liable in advancing with it to warp and twist out of the straight line and out of centre with the dies, from the difference of expansion and contraction of the metal under different degrees of temperature, and from the extreme pressure required, and from other causes which prevent or destroy the uniformity of the thickness and the centrality of the bore of the pipes or tubes, and render that plan ineffective and ineligible.

2d. We use an improved mode of arranging and adjusting the dies or apertures which determine the outer diameter of the pipes or tubes, by which we are enabled easily and readily to bring the same central with the core when applying a fresh set of dies and cores to the cylinders in order to make pipes of different sizes, or at any time, in case the same should get out of their relative true position from any other cause.

3d. We employ a fixed guide-piece, cross-bar, plate, holder, or

bridge, placed near to the dies or apertures at the end of the cylinder, for the purpose of receiving and holding the short fixed or stationary core. We sometimes use a long moveable core, attached to the piston, resembling that of Thomas Burr's, and in this place we employ the fiexd guide-piece or bridge for the purpose of guiding and conducting the long, moveable core, and keeping it central with the dies; the said moveable core pressing through the guide-piece, cross-bar, or bridge.

4th. The chamber (X, figures 1 and 21, on sheet 1,) situated between the bridge or holder and the die, is formed of a conical shape, wide at the top and narrowing towards the die, for the purpose of constricting the metal around the core in its passage under pressure by the diminution of the aperture. This conical chamber is formed by a steel ring accurately fitted to the recess in the bottom of the cylinder, and is intended to rest upon the die, also to protect the adjusting screws by interposition, and to form a support to the cross-bar, guide-piece, plate-holder or bridge resting upon it.

5th. We use an improved construction of the piston, adapted to the cylinder, by which the packing is forced outwards against the inside of the cylinder by the pressure of the face or end of the piston against said packing, which will be better understood by referring to the drawings and description thereof hereinafter given.

6th. We reverse the arrangement of the cylinder and piston, by placing the piston above and the cylinder below, instead of securing the cylinder to the top of the hydraulic press as in Thomas Burr's plan.

In our method, when an hydraulic press of the smaller kind is used, in which the power of the ram is exerted from above, we should attach the piston to the ram, and cause it to be driven downwards into the cylinder fixed stationarily to receive it. Very great force, however, being required, we prefer an hydraulic press of the opposite construction, in which the ram is made to rise perpendicularly upwards, and in this case we secure the piston to the top of the press, and place the cylinder beneath upon the table or platform, with an aperture for the passage of the pipe, all resting upon the usual ram of the hydraulic press. Thus, when the ram ascends, the cylinder is made to rise and advance upon the stationary piston. (See fig. 22, sheet 2.) In connexion with this reversed arrangement, we feed the cylinder through an aperture in the upper end or side opposite to the dies, and directly under the piston, where the die and piston are at the greatest distance apart, (as shewn at K, figure 19, sheet No. 1, annexed.) The said aperture is immediately closed as it passes the lower end of the piston. By this means the necessity of melting out the lead which clogs the dies after each operation, and of filling the cylinder through the dies themselves, or through apertures made for this purpose in the solid end of the cylinder, is obviated; such apertures being injurious to the strength in a part where strength is particularly wanted, and said openings requiring when so used to be stopped by means of plugs or screws. By this reversed arrangement, also great facility in working the machinery is obtained. Oil or other lubricating materials may easily be applied to

the dies and cores, or other parts situated at the bottom of the cylinder, previous to pouring in a fresh charge of metal; and further, the pipes (instead of being forced upwards, and being received above the top of the hydraulic press as in Thomas Burr's method) are caused to issue downwards, and may be immediately wound upon reels, or may be received into a long descending cooling trough, without requiring to be handled while warm and liable to injury.

Lastly. We arrange, combine, and adapt our improved parts or mechanism so as to make two, three, or more lengths of pipes or tubes at one and the same time and operation; and for this purpose we provide two or more apertures, furnished with the requisite apparatus for the formation of the pipes, each substantially resembling and constructed in the same manner with that described for forming a single pipe.

All these improvements will be better understood by referring to the accompanying drawings, which are sectional and detached views of the cylinder and various parts, to which we shall now refer.

Figure 1, sheet 1, is a vertical section of the lower portion of a cylinder with the piston shewn therein, and also our improved construction and adaptation of a short core with the die applied thereto.

Figure 2 is a horizontal section of the cylinder taken in the line *a b*, in fig. 1, or just above the cross-bar or bridge-piece, core, and die.

Figure 3 is another similar partial section of the same taken in the line *c d*, in fig. 1, or just below the cross-bar, for the purpose of shewing the die more clearly.

Figure 4 is a plan view of the die detached, shewing the situation of the core within the aperture.

Figure 5 is a detached side view of the short fixed core and its cross-bar or bridge; and fig. 6 is a plan view of the same. A, A, fig. 1, is a portion of the cylinder B, the piston rod or plunger which is fixed or stationary in the head of the strong frame work of the apparatus.

C is the piston attached to the plunger or rod, the various parts or details of which are shewn separate at fig. 13 to 18, inclusive, and will be described hereafter.

D is the lower end or bottom of the cylinder firmly attached thereto by bolts, and also to a strong hollow table, pillar or platform, placed on the top of the usual ram of the hydraulic press. E is the die which is fitted into the bottom of the cylinder in a recess or cup as shown in the drawings. F, F, are adjusting screws for setting or regulating the situation of the die as regards the core. G, fig. 19, and figs. 2 and 3, is a thin steel plate, fitted very accurately into a cup or recess in the bottom of the cylinder for the purpose of preventing the lead or other set metal from being driven between the edges of the die and recess, or to the adjusting screws, the threads of which would otherwise become clogged. It is exhibited in several of the drawings. But as a substitute for the steel plate G, we prefer to employ the steel ring Z, which forms the conical chamber, and is employed and exhibited in figures 1 and 20, sheet 1.

The diameter of the aperture through the steel ring Z, is greatest at the edge or side next to the bridge or holder, and diminishing down-

wards, it is smallest at the end next to the dies; the apertures being thus of the form of an inverted cone.

Figure 20 is a view of a section of the steel ring Z.

Figure 21 is a sectional representation (on another scale) of the conical chamber X, formed by the steel ring Z, with the die E below, and the bridge I above it.

When fitted in their places in the bottom of the cylinder, as exhibited in figures 1 and 21, the steel ring rests upon the die E, protects the adjusting screws, F, F, by interposition, and forms a support for the cross-bar, bridge, or holder I.

The steel ring Z, forming the conical chamber, has the advantage over the steel plate G, of constricting the metal in its passage under pressure, and of diminishing the friction.

In figures 1, 2, 5, 6, 19, and 21, the bridge or holder is shewn by the letter I, and the short fixed core is represented by the letter H when used.

K, figure 1 and fig. 19, shew the situation of aperture or the opening in the upper part of the cylinder, or side, or end opposite to the dies, through which the cylinder is filled with melted metal, and which is immediately closed by the passage of the piston end.

Figure 7, sheet 2, is another vertical section of the lower part of a cylinder, showing a novel arrangement, combination, and adaptation of our improved mechanism for making four different lengths of pipe at one and the same time.

Fig. 8 is a partial sectional plan view of the same taken in the line *g h*, in fig. 7.

Fig. 9 is a horizontal section or plan view taken at the line *e f*, the plate H being removed.

Fig. 10 is another horizontal section, taken through the dies and cores, being line *a b*, in figure 7.

Fig. 11 is a plan view of the bottom of the cylinder, the dies and cores being removed to shew its construction.

Fig. 12 is a side view of one of the cores detached. A, A, is the cylinder; B, B, the bottom of the ram; C, C, are the dies, the cores and apertures of which are, in this instance, placed in a horizontal position; D, D, are the screws for properly adjusting the horizontal situation of the dies, as regards the cores or mandrils; and E, E, are wedges for adjusting the vertical position of the dies to the cores. F, F, are the cores or mandrils fixed into and forming part of stocks or pieces of metal. G, G, which are mortised into one another, and also into the bottom of the cylinder, as shewn in the drawings, and thereby securely retained in their proper situation. The arrows indicate the course of the metal as it passes out of the cylinder in the form of the tubes or pipes, which is shewn by a red tint as in the former figures. H is the thin steel plate (here used instead of the steel ring) having four apertures formed in it corresponding with the wells and recesses formed in bottom of the cylinder, which steel plate is placed on the top of

the dies to prevent the access of set metal to the adjusting screws; and I, I, are other plates placed in front of the dies for the same purpose, and to prevent its access to the wedges. The bottom of the cylinder has four wells or recesses, K, K, formed in it, as shewn more particularly in figure 11, to allow of the passage of the set metal to the different dies and cores.

Figure 13, sheet 1, is a representation of the piston rod, shown detached from the cylinder, with our improved construction of piston attached thereto. Fig. 14 is a similar representation with the parts of the piston detached, which are shown separate at figures 15, 16, 17, and 18; a is the piston rod; b is the lower end or butt of the piston attached to the rod by the pin C; d is the upper part of the piston. Between the inclined or conical shaped sides of the parts d and b, is placed the ring c, shown detached in plan at figure 17, and in section at figure 18. The sides of this ring are also inclined or conical shaped, and it is cut or severed by means of a saw in the direction shown by the line f, g, in figure 18, and consequently it will be obliged to expand and keep the piston tightly packed with the cylinder under great pressure, and thereby prevent the escape of metal past the piston. The piston is attached to its rod a, by means of a pin h, passed through it, and the pin C, or in any other convenient manner.

Figure 19 is a vertical section of a cylinder and piston, showing our last improvement applied thereto, (viz.,) the application and adaptation of the guide-piece or cross-bar, plate or bridge, through which the long core or mandril attached to the piston passes, for the purpose of keeping it central with the die. A A is the cylinder, B the piston rod, C the piston, D the bottom of the cylinder, E the die, G the thin steel plate, (here exhibited instead of the steel ring that in figures 1 and 21 form the conical chamber.) F the adjusting screws, H the long core attached to the piston C, and travelling with it passes freely through the guide-piece, cross-bar, or bridge I I, which has a properly shaped hole bored through it for this purpose, consequently keeping the core at all times steady and central with the die; K is the aperture for supplying the cylinder with melted metal. Figure 22, sheet 2, exhibits the reversed arrangement of the cylinder A and the piston B; L is the table, M the top of the hydraulic press N; shows the situation of the ram. The operation of making or manufacturing pipes or tubes is as follows:

After a die, steel ring, or plate, bridge, and core of the required diameter have been applied to the bottom of the cylinder and properly adjusted, the cylinder and other parts being lowered, a charge of lead or other metal in a fluid state is admitted through the aperture, (K, fig. 19 and fig. 1,) at the side or end of the cylinder opposite to the dies and immediately under the piston. And as soon as this metal is set, or become hard and solid, and before it becomes cold, the power of the hydraulic press is set in action, and as the ram, hollow-pillar, table, cylinder with its appurtenances, rise upwards, the feeding aperture is first closed by the stationary piston, and when this is effected the metal is forced in the direction of the arrows in figure 1, between the arms or

apertures of the cross-bar, guide-piece, bridge or holder, I, through the conical chamber X, and through the aperture between the die and the core below it, being forced by the extreme pressure and construction to re-unite perfectly around the core in its passage, and leaving the machinery in the form of pipes or tubes.

The pipe may be received in a long descending cooling trough, or may be immediately wound upon the reels, as fast as it is discharged from the machinery.

The set metal is represented in the drawings by a tint of red color, and we would here remark that we wish to be understood that we do not intend to confine ourselves to the mode of operation herein described, by making the cylinder rise with the hydraulic ram and other parts, and keeping the piston stationary, as the same operations and effects will take place when the cylinder is fixed or stationary, and the power of the hydraulic ram applied to the top of the piston rod to cause it to descend into the cylinder; nor do we confine ourselves to making the cross-bar or bridge, which holds or guides either the short or the long cores, with four arms only, since it might be made of various constructions, with one, two, or three or more arms; or it might be a circular plate with holes through it, or it might be constructed as a projection from the side, or from the bottom of the cylinder, with one large aperture nearly surrounding it, and it might hold the core in a horizontal direction if desired, so as to discharge the pipes laterally or otherwise; all which and other variations will readily suggest themselves to any practical engineer without departing from the substantial originality of our invention, the main feature of which is that soft metals when in a "set" or solid state, can be made by extreme pressure to re-unite perfectly around a core after a separation, and thus be formed into solid, compact, and strong pipes and tubes. We may here remark that it might be supposed that the "set" or solid metal being divided in its descent by the several arms of the cross-piece or bridge I, into separate portions, would not re-unite again at the point of entering the space between the die and the core; but our full and successful experience proves the contrary. The metal leaves our improved apparatus in the shape of tubes of perfect solidity and unusual strength. By this process a fine uniformity of thickness and accuracy of bore is arrived at, such as, (it is believed,) has never before been accomplished by any other machinery.

Having now particularly described the nature of our improvements, and the manner of carrying the same into effect, we would here remark that we do not mean or intend to claim any of the parts of the cylinder, plunger, or piston rod, or the manner of fitting them up, nor the mode or method of connecting them to one another, as none of these are new, and they may be varied and fitted up in different ways, to suit different arrangements of machinery.

What we claim as our invention, and desire to secure by letters patent, are—

First. The manner set forth of making pipes or tubes of lead, or

other suitable metals, by pressing or driving with great force the metal while warm though not fluid, but in a "set" or solid state, through the apertures, arms, or divisions of the holder or bridge I, and so causing the metal to re-unite around the core under the pressure after passing the bridge.

Second. The plan of feeding the cylinder through the aperture in the upper end or side of the cylinder opposite to the dies, and closing the aperture by the entry of the piston. In combination with the reversed arrangement of the cylinder and piston, as particularly set forth for the advantage of discharging the pipes downwards, and for other important facilities and purposes described.

Third. The conical form of the chamber between the bridge and the dies by which the metal is constricted in its passage under the pressure.

Fourth. The combination of the guide-piece I, with the long moveable bore attached to the piston, in the manner and for the purposes described.

Fifthly. The adaptation of the improved parts by which several lengths of pipe may be made at one and the same time and operation.

Lastly. The mode of constructing the piston by which the packing is forced outward against the inside of the cylinder by the pressure of the face or end of the piston against said packing as described.

In witness we, the said John Hanson and Charles Hanson, have hereunto set our hands this twenty fifth day of January, A. D. one thousand eight hundred and forty-one.

JOHN HANSON,
CHARLES HANSON.

Witnesses to the signing by the said John Hanson and Charles Hanson, Edw. Lake Hesp, John Dougell.

They also read in evidence the specification of Thomas Burr's patent of 11th April, 1820, which was published in 1822, in the Repertory of Arts, 2d Series, vol. 41, page 267, as follows:

Specification of the patent granted to Thomas Burr, of Shrewsbury, in the county of Salop, plumber, for certain improvements in machinery for manufacturing lead and other metals into pipes and sheets.

Dated, *April 11th*, 1820.

To all to whom these presents shall come, &c. Now know ye, that in compliance with the said proviso, I, the said Thomas Burr, do hereby declare that the nature of my said invention, and the manner in which the same is to be performed, are particularly described and ascertained in and by the following description thereof, that is to say, the particulars of my aforesaid invention, and the manner in which the same are to be performed, are hereinafter set forth and described.

The machinery for making pipe consists in a strong iron hollow cylinder or barrel, true with parallel sides for a piston to work in, open at one end and closed at the other end, except a hole being left in the centre to admit the pipe to pass through, into which said hole is fixed a

washer or thimble, the hole through which is the exact size of the outside of the pipe intended to be made. This washer is made to take out occasionally, (by a screw or otherwise,) to allow a washer to be placed in its stead with a larger or smaller hole, in proportion to the size of the pipe intended to be made; a strong piston is made, so to fit the inside of the cylinder as to allow sufficient space for it easily to work up and down in it from one end to the other; in the centre of the end of the piston that enters the cylinder is fixed perpendicularly a round core or rod, the length of the cylinder and the diameter of the inside of the pipe intended to be made; this core or rod is also made to take off occasionally (by a screw or otherwise) to admit another core or rod to be introduced in its stead, of the same length, but of larger or smaller diameter, in proportion to the size of the pipe wanted. The cylinder may be of any size at pleasure; it must be large enough to contain lead sufficient to make one length of pipe; the larger it is the longer the pipe will be; if it is six inches diameter and one foot long, it will require to be at least four inches thick; and so in proportion. The above may all be made of iron or other strong metal, but the cores or rods or washers will be better of steel. The manner of using the apparatus is as follows: The cylinder is fixed perpendicularly with the end uppermost, to which the washer is fixed; the piston is drawn down until it is nearly out of the cylinder; the upper end of the core or rod will then appear through the centre of the hole in the washer; if it should vary, it must be wedged in the centre; clean melted lead is then poured into the cylinder by the space between the core or rod and washer, until it is full; after it has stood until the lead is set, the piston is forced into the cylinder, which presses out the lead through the aperture between the core or rod and the washer in the form of pipe; when the piston has pressed out all the lead, the pipe is sawed off above the core or rod, the piston is drawn down again to the former place, (viz., nearly out of the cylinder,) a short piece of pipe will then remain, so as to stop the passage or space between the core or rod and the washer; to clear the passage, melted lead, heated nearly to a low red heat, is poured into the pipe remaining, which will very soon melt it away; and the lead must be continued pouring until the cylinder is full as before; to take the melted lead into the cylinder that was poured on to open the passage, a small hole is made close by the side of the washer, which hole, when the cylinder is full, is stopped by a screw pin. After standing as before, the operations are repeated. The method I use to force the piston into the cylinder and draw it back again, is as follows: The cylinder is firmly fixed by a flanch cast thereon for that purpose, in a perpendicular hole through the centre of the top of the frame of a powerful hydraulic press, in such a manner that the upper end appears above the frame of the press, for the purpose of access to it, to pour in the lead, &c.; the press is made to heave upwards and fall back again; the piston is fastened to the heaving rod of the press by a screw, so that it can be easily taken off to clear away the lead that may hang on it when the core or rod is to be changed. I warm the cylinder before I begin to

use it, after it has stood from working, by making a small fire around it to dry it, and also to make it work the easier. I do not claim, under the said letters patent, any particular kind of machinery or power for forcing the piston into the cylinder and drawing it back again, as it may be done by a variety of ways, well known to any person acquainted with machinery and applying power; neither is it essential to have the vessel that contains the lead for making pipe cylindrical; it would do square or in other forms. The object, therefore, of this patent is to make pipes of lead or other suitable metal, by pressing or forcing the metal, in a solid state, through an aperture of the form required, not by drawing or rolling it, as is the present practice.

In witness whereof, &c.

They also read in evidence the patent granted to Burrows Titus, dated on the 19th of April, 1831, and described in the 8th Franklin Journal, published in 1831, and in the Register of Arts, published in London in 1832. Vol. 7, New Series, page 217, as follows:

Abstract of the specification of a patent for an improvement in the mode of casting and making of metallic tubes or pipes, of lead and other soft metals or composition of metals, granted to Burroughs Titus, Ulysses, Tompkins county, New York, April 19, 1831.

The object of this patent is to produce pipes of any desired length without seam or joints. The plan is to conduct the fluid metal into a mould of proper form, but of moderate length, and causing the metal to be cooled so as to adhere, and at the same time giving a regular motion to the tube, so as to draw or force it from the mould as fast as it becomes effectually cooled.

The apparatus by which this is to be effected is shown in the drawing at fig. 8, pl. XIV.

AA is a hollow cylinder of metal, bored out so that its inner diameter shall be equal to that of the pipes intended to be cast. Its length, for a pipe of $1\frac{1}{4}$ inch, may be about 8 inches. It has a flanch, *a a*, at its lower end. This tube gives the form to the outside of the pipe to be cast. B is a plug or core adapted to the inside of the pipe, and made of iron or other suitable metal; it must be perfectly smooth, and slightly tapering, being smallest at top. It has a flanch, *b b*, adapted to the flanch *a a*; this flanch is perforated with a number of holes, to allow the fluid metal to pass up into the mould. CC is a basin to contain water, standing up to the dotted line *f f*. DD is a tube by which the melted metal is to be conveyed from the melting pot, F, into the mould. A stopcock regulates the flow of the metal. The tube DD is furnished with a flanch, *c*, by which it is connected with the mould.

The melting pot may be placed so high up that the pressure of the melted metal will be sufficient to force the pipe from the mould, with a regular motion, as it is cooled by the water, this force being regulated by the quantity admitted by the stopcock. The pipe DD must descend through a flue kept sufficiently heated to keep the lead in a fluid state, and heat must also be applied at its junction with the mould. Instead

of elevating the melting pot, an arrangement may be made for making a mechanical pressure upon the surface of the lead, and thus to produce the same effect.

The pipe, as it is forced off, may be received upon a reel or drum placed above the mould.

We have omitted a large portion of the specifications, but have given what is necessary to render the plan intelligible. A patent has been obtained in England for machinery for the same purpose, but not of the same construction. We believe that under proper modifications, which experience alone must suggest, the principle above described may be advantageously applied to the accomplishment of the object proposed.

They also read in evidence the patent granted to George W. Potter, which was also described in the 12th Franklin Journal of Arts, published in 1833, as follows:

Description of Potter's Pipe Machine, from vol. 12, Franklin Journal, page 185.

Patent granted to George W. Potter, of Otsego county, New York, March 23, 1833.

The apparatus which is the subject of this patent, is intended to cast lead pipes of any required length, without the necessity of soldering separate pieces together.

The cast iron tube which forms the mould in the pipe is placed horizontally, and passes through a cast iron box, which is to be supplied with cold water.

The back end of this tube extends through the water-box, into another, which is a receptacle for melted lead.

A core the size of the bore of the tube extends through it, and into the reservoir, where it is supported by one end, without the necessity of anything to sustain it either within or at the mouth of the tube.

The metal is used in a fluid state, and driven by force pumps into the mould.

The claim is for pressing or receiving the fluid lead into a tube, around a rod, and cooling it in its passage through the tube, in the manner before described, and thus forming the pipe.

They also read in evidence Jesse Fox's deposition, taken 2d February, 1848, in commission, as follows:

Deposition of a witness produced, sworn, and examined, the second day of February, in the year 1848, at Boston, in the county of Suffolk, and State of Massachusetts, under and by virtue of a commission issued out of the circuit court of the United States of America, in the southern district, in a certain cause therein depending and at issue, between Benjamin Tatham, junior, Henry B. Tatham, and George N. Tatham, plaintiffs, and Robert W. Lowber, Thomas Otis Le Roy, and David Smith, defendants.

Jesse Fox, of Somerville, in the county of Middlesex, in the State of Massachusetts, machinist, aged about sixty-one years and upwards, being duly and publicly sworn, pursuant to the directions hereto annexed, and examined on the part of the defendant, doth depose and say, as follows:

1st. To the first interrogatory he saith:

My name is Jesse Fox; I am about sixty-two years of age, reside in Somerville, in Massachusetts, and was bred a physician, and practised about four years; I then went into the business of machinist, and am now engaged in that business.

2nd. To the second interrogatory he saith:

I have been engaged in the manufacture of pipe from lead or other metallic substances. I have been so engaged, at different times, for several years, as far back as 1830 certainly, and, I believe, previous to that time. I was so engaged at Lowell, in Massachusetts. I continued, at different times, for five or six years, or more. I used a machine called a lead pipe machine, invented by me in conjunction with a brother of mine. Our machine was made on a small scale; we made pipe about $\frac{3}{4}$ of an inch in diameter, and about six feet long, the machine not being calculated to make it larger; the pipe we made was good, perfect, and superior to any I ever saw before or since.

3rd. To the third interrogatory he saith:

I have answered this interrogatory in part. The invention was made some time previous to 1830. The same was perfected by 1830 or '31. It was never used, that is the machine we made, except by myself and brother. We used it as stated above in my answer to the second interrogatory.

4th. To the fourth interrogatory he saith:

Our machine was a cast iron vessel—a reservoir—containing one gallon, in which the lead was held; at the bottom of the reservoir was a tube of an internal diameter of the size of the pipe about to be made. In this tube or mould was a mandril or core, about an inch and a half in length, the lower end of which was the size of the calibre or bore of the pipe. This mandril or core was supported or fastened by a head or bridge to the mould, to keep it in the centre, and prevent its being forced out by the pressure of the lead. This head had triangular crevices filed in it, being apertures for lead to pass through. The lead was melted in the cast iron vessel, and kept in a liquid state by a fire on the outside of it. The lead was forced into, and through, the mould, by a piston. We used to drive the piston, sometimes by hammering, and sometimes by a crank motion. The lead being forced through, the mould was cooled as it passed out, by a contrivance by which we kept a constant stream of water passing round the lower end of the mould, under the reservoir; all these parts are new and original with us, and I believe were so absolutely.

The excellency of the machinery consisted in this—that the pipe made by it was a sounder, stronger pipe, and more free from flaws than any pipe then made.

In pipe made in the draw bench method, if there was a flaw, it would not be remedied but rather extended by that method ; whereas our machine, by condensing the lead, prevented the flaws. I will annex a drawing of my machine.

5th. To the fifth interrogatory he saith :

I know not.

Cross.

1st. To the first cross interrogatory he saith :

I made an affidavit in regard to this matter, somewhere in the spring of 1847. Whether it related to this suit, or not, I cannot tell. I never made but one however. I attached a model to it, and there was reference made to it in the affidavit. I have been acquainted with all the modes in use for making lead pipe, in the last thirty years.

2nd. To the second cross interrogatory he saith :

I used hand power, applied sometimes by crank, and sometimes by hammer.

3rd. To the third cross interrogatory he saith :

All I can say is, that the lead was liquid when it entered the mould, and congealed when it came out. What precise state it was in when actually formed, must be matter of inference.

4th. To the fourth cross interrogatory he saith :

I never carried on the manufacture and sale at all. I manufactured pipe at different times, but not to sell. I made small quantities, at different times, in pieces of six feet long, the machine not being adapted to make it longer. I cannot tell how much I made. The pipe was from a half-inch to three quarters of an inch in diameter.

The machine was larger than the model; the reservoir would hold a gallon ; and there were different tubes to it, to make the pipe of the size I have stated.

Last. To the last cross interrogatory he saith :

I know not.

JESSE FOX.

They also read in evidence from the volume fifth, London Journal of Arts, page 76, published in 1823 in London, the specification of a patent granted to John Hague, 29th January, 1822, as follows :

To John Hague, of Great Pearl street, Spitalfields, Middlesex ; for improved methods of making metallic pipes, tubes, or cylinders, by the application of certain machinery and mechanical powers.

Sealed January 29, 1822.

The object of this invention is the casting of metallic pipes by forcing the melted metal through a cylindrical mould, having a fixed core in the middle. Plate V, fig. 1, is a section of the operative part of the machinery; (a) is a trough or pan, in which the metal is to be melted; (b) is the furnace or fire-place under it; (c) is a hollow chest, intended to be filled with the fluid metal through the aperture (d;) when this

chest is filled, the plug (e) is to be fastened down by the screw (f); (g) is the mould containing the core; of which there may be several made to screw into the end of the metal chest, so as to form pipes of different diameters in the same machine; (h) is the core formed of iron or steel, of which also there may be several, variable in diameter according to the intended bore of the pipe. This bore appears to be connected to the interior of the mould at the conical part (i) with grooves formed in that part, for the passage of the melted metal; it is not, however, described in the specification.

When the chest is filled with melted metal as above mentioned, the screw plunger (k) is made to advance by the agency of any suitable mechanical power; and by that means force the melted metal through the narrow space between the mould (g) and core (h.) A box (l) is placed near the end of the mould, to be supplied with cold water, for the purpose of chilling or setting the metal, as it passes through the mould; and as the screw plunger advances, the fluid metal forced into the mould, pushes that portion of pipe which is formed out of the mould, and delivers it on to the cylinder or drum (m.)

The end of the pipe, if made of such metal as is capable of being coiled, is to be made fast to the periphery of the cylinder, and a rope bound round the block upon the axles is passed over a pulley, having a weight suspended at its end; by which means the pipe as delivered from the mould is received upon and coiled round the cylinder or drum as it forms. There is also a box (n) at the back part of the metal chest, which is to be filled with water, for the purpose of setting the melted metal, and preventing it from oozing out between the threads of the screw plunger. By this apparatus, metallic pipes or tubes of different diameters or calibre may be cast and delivered in a perfect state.

Enrolled July, 1822.

They also read in evidence the specification of a patent granted in England to Busk and Harvey, on the 5th of December, 1817, from the 33d volume of Repertory of Arts, 2d series for 1818, page 324, as follows.

Specification of the patent granted to William Busk, of Ponsbourn Park, in the county of Herts, esquire, and Robert Harvey, of Epping, in the county of Essex, victualler, for certain improvements in the means or mode of making pipes or tubes of porcelain clay, or other ductile substances.

Dated December 5, 1817, with an engraving.

To all to whom these presents shall come, &c. Now, know ye, that in compliance with the said proviso, we, the said William Busk and Robert Harvey, do hereby declare, that the nature of our said invention and the manner in which the same is to be performed, are particularly described and ascertained as follows, that is to say:

Our improvements in the means or method of making pipes or tubes of porcelain clay or other ductile substances, consist of, and are effected

by, apparatus of which the pipes or tubes are made or formed in entire cylinders, or such other entire shape may be derived at once. And the apparatus consists of a cylindrical or other conveniently shaped box or vessel wherein to put the material whereof the pipes or tubes are to be prepared, and which may be fixed or placed upon any convenient frame or carriage, and a piston or follower adapted or fitted to the inside of such cylinder or vessel. The cylinder is open at the end, so as to receive the material for use and admit the piston, and close at the other, except an opening of about the size or form of the pipe or tube proposed to be made. To this opening is applied and fixed, by screw or other convenient mode, one end of a pipe or tube (of about the same size or bore as the opening) which we call a neck. Upon the further end of this pipe, tube, or neck, we fit a second pipe or tube, which we term a cap. This cap is made to fasten outside of the former pipe or tube by means of a bayonet ketch or by some other means, so as to admit of its being readily removed and replaced across the inside of the cap. And nearly home to the part which comes in contact with the first pipe, tube, or neck, we place a narrow bar, a, fig. 4, (Plate XV,) into which we fix a small bar or rod, b, at right angles thereto, which extends along the middle to nearly the opposite end of the cap. And upon the end of this rod or bar, but within the cap, we fix a core or button, c, of the size and form desired for the internal orifice of the proposed new porcelain or other pipe, placing such core or button so as not to touch the side of the cap any where, but to come flush with the end of the cap.

Fig. 1, (Plate XV) shows the external appearance of the cylinder or vessel into which the clay or other material is put; as the pipe, tube, or neck fixed thereto. This tube may be straight or bent; we in general use it bent, for the purpose of giving a convenient direction to the new pipes; it may be made to take off and change, as convenience shall require.

Fig. 2 represents the external appearance of the cap detached.

Fig. 3, end view of the same, shewing the core or button with the cross-bar bearing the rod, that supports the core or button.

Fig. 4. A section of the cylinder, neck, pipe, or cup, with the bar *a*, the rod *b*, and the button *c*. The shape and dimensions of all these different parts of the apparatus may be varied at pleasure, according to the form and size of the pipes required to be made. They may be made of metal or wood, or of any other material of sufficient strength, as may be most agreeable.

The clay or other material to be used for making the new pipes being put into the cylinder, the piston, or follower, is then forced into the cylinder, or press, by hand, or any other ordinary mode of pressure of sufficient force. The clay, or other material, is thus become compressed, and is, by degrees, forced out of the cylinder into the neck, and from thence into the cap, where, passing the bar which is placed across the cap, it comes to the core or button at the outer orifice, and there passing, in a continued substance and course round the core, it

comes out an entire pipe at the ultimate orifice of the cap, of the external size and form of such orifice, and of the internal size and form of the core or button. It is obvious, that the construction of the porcelain, or other new pipes, depend principally upon the placing of the core, or button; but we do not mean to confine ourselves strictly to the placing it as above described, but any situation where a similar core or button is adopted in the neck or cap for the like purpose, with the application of pressure as above, we shall consider an infringement of our invention. In witness whereof, &c.

They also read in evidence the specification of a patent granted in England to Ellis & Burr, on the 24th day of December, 1836, and published in vol. II, of the London Journal of Arts for 1838, page 67, as follows:

To Thomas Ellis, of Stamford Hill, in the county of Middlesex, esquire, and Thomas Burr, of Shrewsbury, in the county of Salop, plumber, for their invention of improvements in the manufacture of sheets and pipes, or tubes, and other articles of lead and other metal.—(Sealed 24th November, 1836.)

This invention consists of improvements in that mode of manufacturing tubes, for which a patent was formerly granted by his late Majesty George IV., to Mr. Thomas Burr, bearing date the 11th day of April, 1820, (see London Journal of Arts, vol. I, first series, p. 411;) according to which invention, lead was pressed out of a cylinder through dies, called washers or thimbles, having an internal die or core.

Now, the object of the present improvement consists, first, in applying a certain elongation to such cylinder from which the lead is forced, whereby the patentees are, by the aid of wedges, enabled more securely to hold and adjust the dies used in making the pipes or tubes, and which, for performing one part of their invention, are cut open longitudinally, in the act of making, and thus to produce sheets of lead. Secondly, the invention consists in a mode of applying a coating or covering of tin, or a compound of tin and alloys, to the internal and external surfaces of a lead tube, or pipe, or other articles, produced by forcing lead through dies simultaneously with the formation of the pipe or tube itself, or of the making of the other articles depending on the shape or form of the dies put into the machinery; and thirdly, in the application of a conical or inclined surface, and a suitable cutting instrument to the apparatus for making pipes or tubes, in order (in the act of forming the same) that they may be laid out and flattened into sheets, as hereafter described.

Plate I, fig. 1, represents a section of the machinery used for making lead into pipes or tubes, whether it be laid open into sheets or otherwise, or to be coated internally or externally, or both, with tin or a compound of tin: *aa* is a strong hollow cylinder of cast iron, which is similar to the cylinder used under the former patent; but, in the present cylinder the upper part *bb* is added, there being suitable openings formed therein in order to have the wedges *cc* passed through, they having inclined surfaces at their inner ends resting on the upper part of the die *d*,

(the construction of which is clearly shown in the drawing;) by which means the die *d* is securely held in its place; in addition to which, the die can be most accurately adjusted by driving the wedges with care, first one and then the other; *e* is a smooth steel, or other suitable rod, affixed to the piston *f*, the rod *e* serving as the internal core for forming the inner surface of the pipe or tube, as the metal is forced out through the die *d*. The piston *f* is fitted to slide freely, yet closely, in the cylinder *aa*, and is affixed to the upper end of the plunger, or piston, of an hydraulic press; *g* is a hole drilled or formed in the side of the cylinder *a*, in which lead is kept; and *h* is another hole drilled or formed in the cylinder *aa*, in which tin, or a compound of tin, are placed; and the cylinder *aa* is kept heated by a flue, or jacket, passing round it, to such a degree as will keep the tin well melted; but should the lead in the other hole melt, the workmen must damp off, or lower the heat.

The drawing represents the machinery arranged for making lead pipes or tubes of an inch diameter, which, in the act of making, are coated internally and externally with tin, or a compound thereof. The workman first pours melted lead into the cylinder *aa* through the dies *d*, or through a hole made in the upper end of the cylinder; which hole is afterwards stopped by a plug or screw, the piston being at the lower end of that cylinder, to admit thereof; and the same is permitted to set before the pump of the hydraulic press is put to work.

A quantity of tin is placed on the die *d*, and, as the cylinder *a* and the die *d* are kept to a sufficient degree of temperature at all times, the tin will remain in a fluid state. On the pump of the hydraulic press being worked, the piston of the press will rise in the cylinder *aa*, pressing out the lead therefrom in the form of a tube or pipe, which coming in contact with the fluid tin will be coated on the inside and outside, the workman supplying a quantity of tin on the inside of the tube or pipe, as soon as it rises a few inches above the die *d*.

It will be evident, from the above description, that in case lead pipes uncombined with tin are desired, the tin, or coating compound of tin, is to be omitted; and in case it is desired to make sheets by laying open the pipe or tube produced as above, an apparatus, fig. 2, is to be used, it being intended to open the pipe to such an extent as will allow of the same being readily rolled up as if it were a flat sheet; *g* is a cone securely fixed over the die *d*, so as to allow the core coming up to it at the completion of its movement in the rising of the piston in the cylinder *aa*.

On the cone *g*, or at other convenient position, is affixed a cutting edge, against which the pipe or tube coming as it is forced upward in the act of forming, it is cut, and by the cone is laid open to such an extent as to be sufficient for the purpose of being rolled up as if it were a flat sheet.

The other figure of the drawings shows another die, which may be used for producing other articles, to be coated with tin in the act of making.

Having thus described the nature of our invention, we would have

it understood, that we lay no claim to those parts which were formerly used and described in the said Thomas Burr's said specification to his former patent; but what we do claim is, first, the application of the elongation *b*, of the cylinder *aa*, for receiving the wedges *cc*, for forming sheets and pipes or tubes, and other articles of lead and other metal, as above described; secondly, we claim the mode of coating the inner and outer surfaces of lead pipes or tubes and other articles with tin or compounds thereof, when in the act of making such tubes or pipes and other articles, by the description of machinery herein described; but we do not claim coating of lead pipes or other articles with tin by a subsequent process, that having been before accomplished by other means; and, thirdly, we claim the application to such description of machinery, suitable surfaces and cutting instruments for laying the pipes and tubes longitudinally, and for making sheet lead therefrom in the act of making tubes or pipes, but we do not claim generally the using of a cutting edge in combination with such machinery for making the tubes longitudinally, in order to their being subsequently cut open for open pipes. (Inrolled in the inrolment office, May, 1837.)

They also read in evidence the specification of a patent granted in England to Joseph Bramah, on 31st October, 1797, and published in vol. 9 of the Repertory of Arts, in 1798, in London, as follows:

Specification of the patent granted to Mr. Joseph Bramah, of Piccadilly, in the county of Middlesex, engineer, for his invention of certain new methods of retaining, clarifying, preserving, and drawing off all kinds of liquors, commonly used for the beverage of mankind, more especially those liquors called malt liquors, such as porter, ale, beer, &c., together with sundry improved casks and implements necessary to give his contrivance the full effect. Fig. 4 is a machine showing a new method of making tubes of lead or other soft metals, such as tin, pewter, &c., of all dimensions, and of any given length whatever without joints. This is performed by a process of pumping or forcing lead, &c., in its liquid state, through metal moulds, by which tubes of any given shape or size may be made with great expedition and perfect accuracy. **AA** is an iron melting pot, in the centre of which is placed the pump **B**, which is made of iron or brass, with a piston so nicely fitted into it, as to be capable of preventing liquid lead from passing it when pressed down with considerable force; in the bottom of the pump is fixed a section valve **C**, made of metal, and ground lead tight. On the opposite side of the pump is an arm of pipe, conveyed through the side of the melting pot **AA**, where the junction is also made tight; on the outside, over the mouth of the aperture of this pipe, is fixed a projecting tube or mould **D**, the inside of which is bored perfectly smooth and cylindrical, and its interior diameter is equal to the outside dimensions of the tube intended to be made; the end of the mould or tube **D** next the pot, and where it is joined thereto, is made considerably wider than the mould itself, and this part gradually verges to the side of the mould; in this wide part, close to the side of the pot, is fixed a

cross or bridge, into the centre of which is fixed a mandril or cylindrical bar of iron or steel, turned perfectly smooth and true, and of a diameter exactly equal to the inside or bore of the pipe to be made in the mould D, and it must be in a small and regular degree diminished in its diameter towards the external end, which end must terminate with the end of the mould or thereabouts; this mandril, shown at E, must be so fixed in the cross or bridge as to be perfectly in the centre of the mould at the front as well as at the back end, and there must be sufficient openings in the cross or bridge in the wide part of the mould, to allow the lead to communicate in its liquid state to the front of the conical part, so that it may again unite in a fluid state after passing the cross or bridge which separates it, and into which the mandril or inside core is fastened; the mould D must likewise cross the fire flue of the melting pot so as to be kept always hot, that the lead which then surrounds the mandril or core may be kept in its fluid state nearly to the external point of the mould. This done, and the pot AA filled with liquid lead, then, by working the pump with a lever of sufficient power, the lead will be pumped or forced through the mould, and its heat therein being so regulated as to chill a little before it approaches the open air at the point of the mould, it will keep issuing out in a solid state, and thus pipes of any length and size may be made perfectly sound and without a single joint. In order to avoid the nicety of causing the lead to chill of its own accord while passing through the mould, it will perhaps be proper to insert the point or extreme end of the mould in the side of a cistern of hot water, or the like.

The defendants, Le Roy & Smith, thereupon gave evidence tending to prove that John and Charles Hanson were not the original and first inventors of the combination of machinery described in the said letters patent.

That the invention therein described was not useful, and that the lead pipe, manufactured upon the plan described in the said patent, was not good.

That the combination of machinery for making lead pipe, described in the said public works as having been invented by Burrows Titus, by George W. Potter, by Jesse Fox, by John Hague, and by Joseph Bramah, were substantially the same as that used by the plaintiffs.

That the combination of machinery, patented as hereinbefore stated, by Busk & Harvey, for making pipes of clay, and that used for making maccaroni, were substantially the same as that described in the said patent granted to the plaintiffs.

And the said defendants did, then and there, give in evidence tending to prove that lead, when recently become set, and while under heat and extreme pressure in a close vessel, would not reunite perfectly after a separation of its parts; and that in the process as described in the plaintiffs' patent, and as used by them, it was not in a set state when it was separated by passing the bridges, but was in a fluid state.

And the defendants did then and there give evidence tending to

prove that they, the said Le Roy & Smith, were not interested or concerned in the manufacture of the said lead pipe, or in the making or use of the machinery by which it was made; that it was made for them by the other defendant, the said Lowber, at a certain price per hundred pounds for manufacturing, they finding the lead and capital under the contracts of April 13th and May 13th, 1846; and that they had not infringed upon the said patent of the plaintiffs.

And the said defendants did then and there also give evidence tending to prove that the improvement described in the said letters patent, dated March 4th, 1846, was not for the same invention as that for which letters patent had previously been granted to the said John and Charles Hanson, and to the said Benjamin Tatham, and Henry B. Tatham, hereinbefore set forth.

And the said defendants did also, then and there, give evidence to prove that the said plaintiffs had failed and neglected, for the space of eighteen months from the date of the said patent, dated March 29th, 1841, to put and continue on sale to the public, on reasonable terms, the invention or discovery for which the said patent issued.

The evidence being closed, the judge charged the jury—

That the first question which it was material to determine was, what was the invention or discovery of John and Charles Hanson for which their patent had issued, as the precise character of that invention had been the subject of controversy on the trial.

The patentees state in their specification, that the invention consists in certain improvements upon, and additions to, machinery for making pipes from metal, capable of being pressed as described in Burr's patent, dated April 11, 1820. They then describe Burr's apparatus, and the process by which the pipe was made by it, and state the defects of that plan, in consequence of which, they say, it failed to go into general use.

These defects they claim to have overcome and remedied, and state that they had found that lead, and some of its alloys, when just set, or short of fluidity, and under heat and great pressure, in a close vessel, would reunite, after a separation of its parts, as completely as if it had not been separated, or in other words, that under these circumstances it could be welded.

That on this discovery, and in reference to and in connexion with it, they made a change in the machinery of Burr, by which they succeded in making perfect pipes, and were enabled to use a bridge at the end of the cylinder and short core, and thus surmount the difficulty of the Burr machine.

They also state that they do not claim any of the parts, the cylinder, core, die, or bridge, but that they claimed the combination when used to form pipes of metal, under heat and pressure, in the way they have described.

There can be no doubt that if this combination is new, and produces a new and useful result, it is the proper subject of a patent. The result is a new manufacture.

And, even if the mere combination of machinery in the abstract is

not new, still, if used and applied in connexion with the practical development of a principle, newly discovered, producing a new and useful result, the subject is patentable. To which last opinion and decision the counsel for the defendants did then and there except.

In this view, the improvement of the plaintiffs is the application of a combination of machinery to a new end; to the development and application of a new principle, resulting in a new and useful manufacture.

That the discovery of a new principle is not patentable, but it must be embodied and brought into operation by machinery so as to produce a new and useful result.

Upon this view of the patent, it is an important question for the jury to determine, from the evidence, whether the fact is established on which the alleged improvement is founded that lead in a set, or semi-solid state, can thus be re-united or welded after separation.

The judge here commented briefly upon the testimony, referring to the experiments which were testified to, and the results of which were exhibited to the jury, on the part of the plaintiffs and defendants, and in continuation stated:

That there was one experiment which was testified to by Mr. Keller, and the result of which was shown to the jury, which was made under circumstances that seem not to be subject to any misapprehension, and which, if he is not mistaken and his testimony is correct, would seem to settle the question.

But this was a question of fact to be decided by the jury on the evidence. Hereupon the counsel for the defendants, excepted to this part of the charge of the judges.

That it had been objected that the improvement described in the patent of March 14, 1846, was different from that of March 29th, 1841. The act only authorized a re-issue for the same invention, the first specification being defective.

That he had compared the descriptions contained in the two patents, and though the language was in some parts different, it would be found that the improvement was substantially the same, and that he therefore apprehended they would have no great difficulty in this branch of the case, (to which the defendants' counsel excepted.)

That it was also objected that the plaintiffs' patent was invalid for want of originality; that the invention had been before described in public works, and Bramah, Hague, Titus, Fox, and Potter were relied on by the defendants.

That in the view taken by the court in the construction of the patent it was not material whether the mere combinations of machinery referred to were similar to the combination used by the Hansons, because the originality did not consist in the novelty of the machinery, but in bringing a newly discovered principle into practical application, by which a useful article of manufacture is produced, and wrought pipe made as distinguished from cast pipe. Hereupon the defendants' counsel excepted.

That in the patents referred to, from the year 1797 to 1832, the combination which was claimed to be identical was confessedly used for making pipe, by casting with fluid lead in a mould, and after it was set by the application of water, forcing it out.

And the question is whether any of these inventions are substantially the same as the plaintiffs; whether even if by these modes pipe had been successfully made for common use, it would have been made in the same manner as the Hansons'; to which opinion the counsel for the defendants excepted.

That it was further objected that the patentees have forfeited their rights, on account of having omitted to put and continue the invention on sale within eighteen months after the patent was granted, upon reasonable terms; the judge here commented upon the testimony on this part of the case, and in continuation said:

That it was not essential, under the section of the statue referred to, that the patentees should take active means for the purpose of putting their invention in market and forcing a sale, but that they should at all times be ready to sell at a fair price, when a reasonable offer was made.

That it was for the jury to say whether it was put and continued on sale under this view of the law; to which opinion the counsel for the defendants excepted.

That the defendants, LeRoy and Smith, contend that they have not infringed the plaintiffs' patent, that they were but the purchases of the pipe, and that Lowber was the manufacturer, under the agreement which has been read.

The judge here referred to the evidence on this branch of the case, and said:

That if the contract made by the defendants with Lowber, was bona fide, and they had no connexion with the manufacture of the articles, except to furnish lead and pay him a given price, deducting the expenses; and if the contract was in fact carried out and acted upon in that manner, then the defendants would not be liable. But if the agreement was only colorable, and was entered into for the purpose of deriving the benefit and profits of the business without assuming the responsibility for the use of the invention, and for the purpose of throwing the responsibility on Lowber, who was insolvent, then they were as responsible as he was.

That aiding and assisting a person in carrying on the business and in operating the machinery would implicate the parties so engaged. If, therefore, these defendants participated actively in conducting the machine, directing and supervising its operations; if the evidence establishes that position, then as aiding and assisting they are as responsible as Lowber, (to which last opinion and decision the defendants' counsel excepted.)

Prior to the giving of the preceding charge to the jury, the defendants' counsel requested the court to instruct them according to the following written proposition submitted; and his honor, after he deliver-

ed the said charge, took up the said propositions in their order, and gave the instructions to the jury, which are respectively subjoined thereto.

Proposition I. If the jury believe that the agreements executed on the 13th of April and 13th of May, 1846, by which Lowber, as manufacturer, was to make the pipe for Le Roy & Co., on his machine, at 55 cts. the 100 lbs., was real and bona fide, on an actual dissolution of the partnership of Lowber & Le Roy, and not colorable to throw the responsibility of working the machine on Lowber alone, then the plaintiffs cannot recover.

Upon which his honor said that he had already given all the instructions he deemed necessary on that point ; the proposition was correct, and it was for the jury to decide that fact.

Proposition II. That even if the Tathams first introduced the pipe in question in this country as an article of commerce, that does not give them any right to recover, unless the patent under which they claim were good and valid, for an invention not before known, used, or described in a public work.

Upon which his honor instructed the jury, as requested by the defendants' counsel.

Proposition III. That if the jury believe that the combination patented by the plaintiffs was before patented by Burroughs Titus, or any one else in this country, or patented and described in a well known public work abroad, the plaintiffs cannot recover, although such machines thus patented were not actually put in operation, so as to make pipe for the public.

Upon which his honor instructed the jury that he had already stated to them that the plaintiffs' invention did not consist in the mere combination of machinery, and, therefore, if those patents were for casting lead pipe, the point was not material, that it was not necessary that they would have made pipe for public use to defeat a subsequent patent. To which instruction, and refusal to instruct the jury as requested, the defendants' counsel excepted.

Proposition IV. That the Tatham patent is void on its face, the Burr machine having the entire combination, including heat and pressure, and the lead in a set state. The patent is void for claiming too much; should only have been for the improvement, viz., substituting the bridge and short core for the long core, and not for the whole combination.

His honor declined to give this instruction, to which the defendants' counsel excepted.

Proposition V. That the bridge and short core having been before patented in this country by Burroughs Titus, and also before used in other machines, no claim could be made for introducing into Burr's combination such bridge.

Upon which his honor instructed the jury as follows: undoubtedly that is so, but that is not the plaintiffs' claim.

Proposition VI. That the state of the lead, when used as described in the plaintiffs' specification, being a principle of nature, is not the

subject of a patent, either alone or in combination with the machine mentioned in that specification.

To which his honor stated, the first part of the proposition was correct and the latter part not; and the defendants' counsel excepted.

Proposition VII. That the using of a metal in a certain state, or at a certain temperature, alone, or in combination with a machine, was not the subject of a patent.

To which his honor stated, I have already instructed the jury that the invention, as described by the Hansons, is a patentable subject; to which the defendants' counsel excepted.

Proposition VIII. That if the jury believe that the same combination of cylinder, piston, bridge, short core, die, and chamber, under heat and pressure, was before patented in this country by Burroughs Titus, then the plaintiffs cannot recover.

Whereupon his honor instructed the jury, that novelty in the mere combination of the machinery was not essential to the plaintiffs' right to recover, except as connected with the development and application of the principle before mentioned; to which the defendants' counsel excepted.

Proposition IX. That if the jury believe that the same combination of cylinder, piston, bridge, short core, die, and chamber, under heat and pressure, had before been patented in England by Bramah, and published in a well known work, then the plaintiffs cannot recover.

His honor instructed the jury that Bramah's patent and the Tathams' were not identical, and declined to instruct them as requested; to all which the defendants' counsel excepted.

Proposition X. That if the jury believed that the Burr, Bramah, Titus, and Hague machines, or either of them, were published to the world in well known public works, and had the same combination, in whole or in part, as the Hanson machine, up to a certain point, the Tathams patent is void, for claiming too much, viz., the whole combination.

His honor instructed the jury that he had explained to them his views on that part of the case, and declined to instruct them as requested, in the form of which the proposition was stated; and to which the defendants' counsel excepted.

Proposition XI. That the re-issue of the patent of 1846, on which alone the plaintiffs can claim, was not warranted by the patent of 1841, it being for a different, and not the same, invention; was described by inadvertence, accident, or mistake; and, in fact, was a new patent, under color of a re-issue.

That if the jury believe that the re-issue of 1846 was for a different invention from the patent of 1841, and not for the same invention, misdescribed by inadvertence, accident, or mistake, then the plaintiffs cannot recover.

His honor declined to instruct the jury according to the first branch of this proposition, to which the defendants' counsel excepted; but did instruct them in the affirmative upon the last branch thereof.

Proposition XII. That if the jury believe that the combination patented was before described in some well known public work, either in this country or in England, the plaintiffs cannot recover, although such machine, or the pipe made by it, was never introduced in this country.

Upon which his honor instructed the jury in the affirmative.

Proposition XIII. If the jury believe that the combination claimed was before known or used, to make lead pipe, by others than the Hansons or the Tathams, the plaintiffs are not entitled to recover, no matter how limited such knowledge or use was, if the invention was not kept secret.

Upon which his honor instructed the jury in the affirmative.

Proposition XIV. That if the Maccaroni machine, or the Busk and Harvey clay pipe machine, contained the same combination as the plaintiffs' machine, that the plaintiffs cannot recover, by reason of applying the same combination to a new use.

Which instructions his honor declined to give, and stated that he had explained to them his views on that subject; and the defendants' counsel excepted.

Proposition XV. That if the jury believe that Mr. Lowber's machine was used by his men when the lead was in a fluid, and not in a set or solid, state, then there was no infringement, and the plaintiffs cannot recover, if the plaintiffs' patent were valid.

Upon which his honor instructed the jury in the affirmative.

Proposition XVI. That the jury are the sole and exclusive judges, as questions of fact, whether the combination and process were the same in plaintiffs' machine as was in Bramah's, or in any other of the machines proved on the trial.

Upon which his honor charged the jury that this was so undoubtedly, subject, however, to the principles of law, as laid down in his preceding charge and instructions; to which the defendants' counsel excepted.

Proposition XVII. That if the jury believe that the lead, when it may be successfully used to make pipe with plaintiffs' machine, must not be in a set or solid state, as described in their specification, and that it can only be thus used in a fluid or pasty state, then that the patent is void, and the jury should find for the defendants, on the ground that the specification does not fairly and fully describe the nature of the invention claimed, nor the condition in which the lead should be used, so as to enable the public to ascertain the true nature of the invention, the manner of using the machine, and the condition in which the lead ought to be used.

Which instruction his honor answered in the affirmative.

The jury then retired to consider their verdict, under the said charge and instructions; and subsequently, on the 25th day of May, 1849, returned into court with a verdict for the said plaintiffs for $11,394 damages, and six cents costs.

And, inasmuch as the said several matters aforsaid do not appear by

the record of the said verdict, the said defendants' counsel did then and there request his honor the said judge to put his seal to this bill of exceptions, containing the said several matters aforesaid; and his honor the said judge did, in pursuance of the said request, and of the statute in such case made and provided, put his seal to this bill of exceptions, containing the said several matters aforesaid, at the city of New York aforesaid, the same 25th day of May, 1849.

S. NELSON.

(Endorsed.)

Filed November 28, 1850.

Supreme Court of the United States.

THOMAS OTIS LE ROY, and David Smith, impleaded with Robert W. Lowber, plaintiffs in error,
ads.
Benjamin Tatham, jr., Henry B. Tatham, and George N. Tatham, defendants in error.

Of the term of December, 1850.

Afterwards, to wit, on the first Monday of December, in this same term, before the justices of this Court, at the Capitol, in the city of Washington, come the said plaintiffs in error, by William Curtis Noyes, their attorney, and say, that in the record and proceedings aforesaid, and also in giving the judgment aforesaid, there is manifest error in this, to wit, that the declaration aforesaid and the matters therein contained, are not sufficient in law for the said defendants in error to have or maintain their aforesaid action thereof against them, the said plaintiffs in error; there is also error in this, to wit, by the record aforesaid, it appears that the judgment aforesaid, in form aforesaid given, was given for the said defendants in error, against the said plaintiffs in error; whereas by the law of the land the said judgment ought to have been given for the said plaintiffs in error against the said defendants in error. And the said plaintiffs in error pray that the judgment aforesaid, for the errors aforesaid, and other errors in the record aforesaid, may be reversed, annulled, and altogether held for nothing, and that they may be restored to all things which they have lost by reason of the said judgment.

WM. CURTIS NOYES,
Att'y and counsel for pl'ffs in error.

Supreme Court of the United States.

BENJAMIN TATHAM, jr., Henry B. Tatham, and George N. Tatham, defendants in error,
ads.
THOMAS OTIS LE ROY and David Smith, (impleaded with Robert W. Lowber,) plaintiffs in error.

And hereupon the said Benjamin Tatham, junior, Henry B. Tatham, and George N. Tatham, by Seth P. Staples, their attorney, come and say, that there is no error either in the record and proceedings aforesaid, or in giving the judgment aforesaid; and they pray that the said Supreme Court may proceed to examine, as well the record and proceedings aforesaid, as the matters aforesaid assigned for error, and that the judgment aforesaid in manner aforesaid given may be in all things affirmed, &c.

SETH P. STAPLES,
For def'ts in error.